Federal Transit Administration • Virginia Department of Rail and Public Transportation
Washington Metropolitan Area Transit Authority • in cooperation with the Federal Aviation Administration

# Dulles Corridor Rapid Transit Project Draft Environmental Impact Statement and Section 4(f) Evaluation

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Dulles Corridor
Rapid Transit Project

**DULLES CORRIDOR RAPID TRANSIT PROJECT**

**DRAFT ENVIRONMENTAL IMPACT STATEMENT**

**AND SECTION 4(f) EVALUATION**

Prepared by:

**US Department of Transportation (US DOT)**
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and
**Washington Metropolitan Area Transit Authority (WMATA)**
in cooperation with
**Federal Aviation Administration (FAA)**

Pursuant to:
National Environmental Policy Act of 1969, Section 102(2)(c), 42 U.S.C. 4332 (2)(c);
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Federal Transit Act, 53 U.S.C. Section 5323(b), Section 5309(e)(2) – (7), 5301(e), and 5324 (b)(1) – (3);
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**AND**
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# DULLES CORRIDOR RAPID TRANSIT PROJECT
# DRAFT ENVIRONMENTAL IMPACT STATEMENT

## ABSTRACT

This Draft Environmental Impact Statement (DEIS) describes and summarizes the potential transportation and environmental impacts related to providing transit system enhancements in the Dulles Corridor by providing a direct connection to the existing regional Metrorail system. A comparative evaluation of the alternatives considered and associated costs are also included.

The Dulles Corridor Rapid Transit Project is proposed to improve mobility and transit accessibility in the rapidly developing and congested Dulles Corridor. The limits of the project extend from the West Falls Church Metrorail Station in Fairfax County, to the vicinity of Route 772 in Loudoun County. The corridor is bounded by the Potomac River on the north and US 50 on the south. The project corridor is approximately 24 miles in length.

This DEIS provides information to aid in the evaluation of the transit alternatives considered to address FTA's, VDOT's and WMATA's goals of improving mobility in the Dulles Corridor, supporting economic growth, and enhancing the environment.

The publication of this document is part of the environmental review process specified by the *National Environmental Policy Act of 1969* (NEPA), as amended, and the regulations pursuant to the act, including full public participation in Federally funded transit projects.

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Information of the date, time, and location of the public hearing will be published in the local newspapers. Information can also be obtained from the project hotline 1-888-566-7245. Comments on this document may be submitted in writing or made orally at the public hearing. Written comments should be sent to Corey Hill, Northern Virginia Rail Manager, Department of Rail and Public Transportation, 1550 Wilson Boulevard, Suite 300, Arlington, Virginia, 22209. Comments may also be sent via e-mail to Corey Hill at dullescorridor@aol.com.

Comments must be received by: August 28, 2002

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# Executive Summary S

# AN OPPORTUNITY AND AN INVITATION

In January of 2001, the 103-mile Adopted Washington Regional Metrorail System was completed, successfully implementing a vision for a world-class transit system that was conceived almost 50 years ago. To meet the needs of continued, robust growth beyond the service area of the Metrorail system, new investment in regional transportation improvements is needed where existing and planned facilities can no longer support the demands of our businesses and communities. One such area is the Dulles Corridor, which lies west of the nation's capital in northern Virginia in Fairfax and Loudoun counties, and is a vibrant, diverse mix of businesses, neighborhoods, and recreational amenities that continues to attract population and employment growth at almost twice the rate of the region.

*New transit investment in the Dulles Corridor will link the region's key activity centers, serving growth and development beyond the completed Regional Metrorail System.*

To respond to increasing travel demand, public agencies and the private sector are working to develop and select new rapid transit improvements to serve the corridor. This Draft Environmental Impact Statement (EIS) describes why improvements are needed, how different alternatives will meet these needs, what the economic, environmental, and social effects of the proposed improvements would be, how much the improvements would cost, and what actions would be required to make the proposed improvements become a reality. The Draft EIS is being circulated to assist decision-makers and the public in selecting a Locally Preferred Alternative for transit improvements in the Dulles Corridor.

The Federal Transit Administration (FTA), the Virginia Department of Rail and Public Transportation (DRPT), and the Washington Metropolitan Area Transit Authority (WMATA) in cooperation with the Federal Aviation Administration (FAA), are proposing transit improvements in the Dulles Corridor to:

- Improve mobility and accessibility;
- Enhance economic development opportunities; and,
- Enhance community and environmental resources.

Bus Rapid Transit

The improvements would extend from the existing Metrorail Orange Line at the East Falls Church Station in Fairfax County, through Tysons Corner, to Dulles Airport, before terminating in eastern Loudoun County. Four different Build Alternatives using either Bus Rapid Transit (BRT), Metrorail or combinations thereof are being considered.

The proposed improvements will provide high-quality, high-capacity transit service between Washington Dulles International Airport and the region's core with a direct connection to the existing Metrorail system. The improvements would be funded by FTA, the Commonwealth of Virginia, Fairfax County, Loudoun County, and the Metropolitan Washington Airports Authority (MWAA), along with a possibility of private sector funding for any Metrorail portion of the project.

*Throughout the Draft EIS process, the public, elected officials, and federal, state and local agencies worked together to define needs, identify solutions, evaluate alternatives, assess impacts, and select transit improvements.*

The transit improvements would enhance the overall transportation system, improving transit service, ridership, and transit travel times, while supporting the existing and future land uses and economic development. The effects of the different levels of investment associated with the potential improvements are described in this document. Overall, the potential adverse impacts of the proposed improvements on the human and natural environment are expected to be minor. We invite your comments and welcome your observations regarding the proposed improvements at the public hearing in your area, or in writing to Mr. Corey Hill, Northern Virginia Regional Manager, DRPT, 1550 Wilson Blvd, Suite 300, Arlington, VA 22209 by the close of the public comment period.

*Investment in efficient and reliable transportation facilities to meet travel needs will contribute to the area's economic, social, and environmental quality.*

## Understanding the Challenge

The Dulles Corridor, located in Northern Virginia west of the nation's capital, is one of the Washington metropolitan region's most dynamic and rapidly growing areas. The corridor is characterized by a wide range of uses and opportunities, and includes major business, residential and recreational destinations. The Dulles Corridor is home to the headquarters of leading technology firms and Tysons Corner, one of the nation's largest employment and retail shopping centers. In addition, the corridor is characterized by recreational attractions such as the Washington and Old Dominion (W&OD) Railroad Regional Park, major transportation facilities including Washington Dulles International Airport, and many of the most desirable residential neighborhoods in the region. As population and employment continue to grow significantly over the next 25 years, the demand for travel will continue to stress existing transportation facilities, and will exceed the capacity of planned transportation improvements.

*The Dulles Corridor is a diverse, dynamic environment of economic prosperity and robust growth.*

*The adopted 2020 Northern Virginia Plan, as well as local plans, calls for significant investment in transit in the corridor.*

## Leveraging the Opportunity

As part of the solution to maintain the regional competitiveness of the corridor and to preserve the quality of the environment that makes the Dulles Corridor attractive to residents, businesses, and visitors alike, FTA, DRPT, and WMATA are proposing the Dulles Corridor Rapid Transit Project. This new rapid transit line would serve as an extension of the existing 103-mile regional Metrorail system into Fairfax County and eastern Loudoun County, Virginia, providing service to key business, residential and recreational activity centers throughout the Dulles Corridor. The new transit line would be fully integrated with the existing Metrorail system in terms of scheduling, signage, and fare collection, increasing the capacity to travel to and through the Dulles Corridor, and enhancing regional connectivity, mobility, and accessibility.

*New transportation investment is needed to expand the service area of the 103-mile Metrorail system to accommodate growth and meet future needs.*


*The Draft EIS advances a solution to corridor needs by providing decision-makers, the business community, and area residents the opportunity and information to evaluate proposed improvements.*

Public Meeting to discuss area needs and solutions

*Over the next 25 years the Dulles Corridor population and employment will increase at almost twice the rate of projected growth for the rest of the region.*

### *Advancing the Reality*

This Draft EIS is a significant milestone in advancing a solution to address the challenges and leverage the opportunities in the Dulles Corridor, and to assist the region in realizing and maintaining its full potential. The Draft EIS has been prepared in accordance with the provisions of the National Environmental Policy Act (NEPA). Its purpose is to assist decision-makers and the general public in understanding, evaluating, and selecting a transportation investment strategy to forge a new future for the Dulles Corridor and the region, consistent with federal, state and local environmental and community initiatives. The FTA is the lead federal agency for the project, and FAA is a federal cooperating agency. The Draft EIS enables the consideration and advancement of proposed improvements that will provide short-term enhancements and long-term solutions to promote a sustainable transportation system for the Dulles Corridor that meets local and regional desires and needs.

### *Overview*

This Executive Summary provides an overview of the findings and conclusions of the Draft EIS in terms of the following:

- Future Needs and Challenges
- The Decision at Hand
- Project Description
- Choices for Tomorrow
- Coordination Opportunities
- Future Actions

## FUTURE NEEDS AND CHALLENGES

Extending from Tysons Corner to Dulles Airport and into Loudoun County, Northern Virginia's Dulles Corridor is the "Main Street" of one of the nation's fastest-growing business and population centers. With the Dulles Corridor's increasing attractiveness as a place to live and work, travel in the corridor has been steadily growing over the past 15 years. This increasing travel demand has strained the capacity of the existing transportation network, causing delays and increasing travel times between activity centers within the corridor and the region. The central and eastern portions of the corridor currently experience some of the region's worst traffic congestion, constraining the economic opportunities and threatening the quality of life that make the corridor a thriving regional center. The Northern Virginia 2020 Transportation Plan and local comprehensive plans recognize the need for significant future investment in transit in the corridor.

*Major activity centers will continue to generate diverse travel needs, exceeding the capacity of existing and planned improvements.*

The 24-mile corridor includes a diverse mix of high-intensity office development, low-density residential development, and numerous cultural and recreational resources. Regionally significant activity centers in the corridor (such as Tysons Corner, Reston, Herndon, Dulles Airport, and eastern Loudoun County) continue to expand and prosper. This continued growth is generating an unfulfilled demand for additional and improved transportation facilities to enhance mobility and accessibility within and through the corridor, and to provide a full range of transportation choices to meet a range of travel needs.

Key centers include:

**Tysons Corner** – The "downtown" of Fairfax County, Tysons Corner has emerged as one of the most recognizable "edge cities" in the nation, with over 30 million square feet of commercial space and the nation's eighth largest shopping center. With Tysons Corner Center and Tysons Galleria as its centerpieces, Tysons Corner has emerged as a regional shopping destination, housing more than 330 stores and attracting 1.9 million visitors annually. Tysons Corner is one of the largest suburban business districts in the country and is larger, both in geographic size (3 square miles) and employment (90,000 jobs), than many of the central business districts in major U.S. cities–including Miami, San Diego, and St. Louis.

Tysons Corner

**Reston** – One of the premier planned communities in North America, Reston encompasses more than 7,400 acres and a population of more than 63,000 people living in a diverse mix of housing types. The area has also emerged as a center for high-technology firms, and boasts one of the highest concentrations of office development in Fairfax County (second only to Tysons Corner). The existing employment of the Reston area of approximately 44,000 jobs is expected to increase to nearly 65,000 in 2025. Reston Town Center has more than 50 shops and restaurants, a multiplex theater, an outdoor ice rink, a 514-room hotel, and almost 1 million square feet of office space.

Reston

**Herndon –** Similar to other areas of the Dulles Corridor, Herndon has grown over the last decade, while maintaining a balance of commercial, residential, and recreational uses. Growth is projected to continue, with a build-out potential for Herndon commercial properties in excess of 30 million square feet of floor space.

Herndon

***The Metropolitan Washington Council of Governments (MWCOG) projections indicate that in the future the Tysons Corner and Dulles/Reston area would become the region's second largest employment concentration, second only to the District of Columbia.***

*Corridor Congestion in Tysons Corner*

**Dulles Airport** – Located on 11,000 acres in the western end of the corridor, Washington Dulles International Airport is one of the world's fastest growing airports, employing more than 15,400 persons. As demand for air travel increases, the region is increasingly dependent upon Dulles Airport. The recently expanded airport is projected to serve 32 million passengers by 2010. The Smithsonian's National Air and Space Museum is scheduled to open the Steven F. Udvar-Hazy Center in 2003, which is expected to attract three million visitors annually.

Dulles Airport

**Loudoun County** – Located in the westernmost portion of the Dulles Corridor, Loudoun is the fastest-growing county in Virginia and the second fastest-growing county in the United States. In addition to extensive population growth, Loudoun County has experienced substantial growth in the high-tech industry, including the relocation of America Online/Time Warner and WorldCom headquarters to the county. As a result of these industry leaders and others attracted to the corridor, today more than half of the world's Internet traffic flows through the Dulles Corridor.

Loudoun County

Over the next 25 years, the Dulles Corridor will continue to grow as a regional employment destination and population center, at almost double the anticipated growth rate of the entire Washington metropolitan region. Population in the corridor is expected to increase by 56 percent (compared with 32 percent for the region), adding 206,000 persons. The addition of 203,000 jobs will result in a 71 percent increase in employment levels, compared to an average increase of 39 percent throughout the region. Parallel increases in travel demand throughout the corridor are projected to exceed the capacity of the already overburdened transportation system, resulting in gridlock traffic conditions on numerous routes, further degradation of air quality, and a threat to the valued quality of life in the Dulles Corridor.

*Existing transportation levels of service in the corridor cannot be maintained or improved without a multi-modal solution that serves diverse needs and promotes economic vitality.*

Currently planned roadway improvements are only expected to maintain existing levels of service in the corridor, and will not be able to meet future demand. Due to right-of-way, financial, and air quality constraints, additional roadway expansion beyond these planned improvements cannot be accommodated in the corridor. Existing local bus service provides an inadequate alternative to auto travel, because it also can be hampered by traffic on already congested roadways, particularly in the Tysons Corner area. Given these factors and a need to reduce auto emissions in the region to meet federal air quality standards, alternative transportation improvements in the Dulles Corridor, such as a high-capacity rapid transit line, have long been the focus of public and private sector studies.

*Congested conditions, availability of right-of-way, and constraints on building new roadways dictate the need for alternative means of travel.*

Corridor congestion near Reston


## THE DECISION AT HAND

This Draft EIS is a decision tool for shaping the future of the Dulles Corridor and addressing regional transportation demands by leveraging past investments and making new investments to serve the area's changing needs. In deciding about the need for action and selecting from among available choices, decision-makers, local residents, and the business community are faced with evaluating how well various transportation improvements can meet corridor and regional needs.

*According to a recent survey by the American Public Transportation Association, support for transit investment in the Washington metropolitan region is almost twice that of support nationwide.*

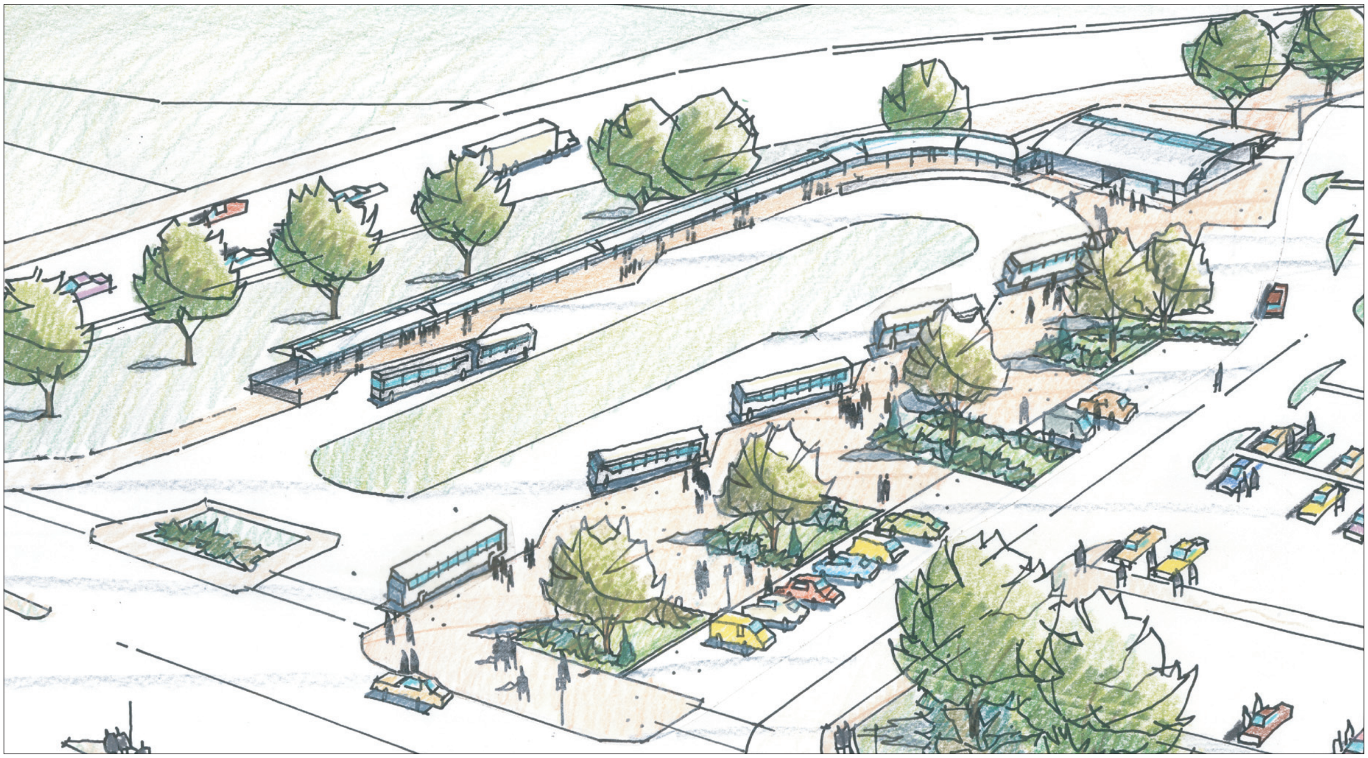
The selection of a course of action is driven by the following considerations:

- Meeting the mobility and accessibility needs of future residents, businesses, and visitors;
- Serving and supporting future land use and development patterns while leveraging economic development and redevelopment opportunities for a vibrant, sustainable future;
- Accommodating future increases in the volume of travel demand on a roadway system that is largely "built-out", and the associated constraints for existing and planned transit systems to operate on these roadways; and
- Maintaining the air quality of the Washington metropolitan region by contributing to the attainment of regional air quality goals.

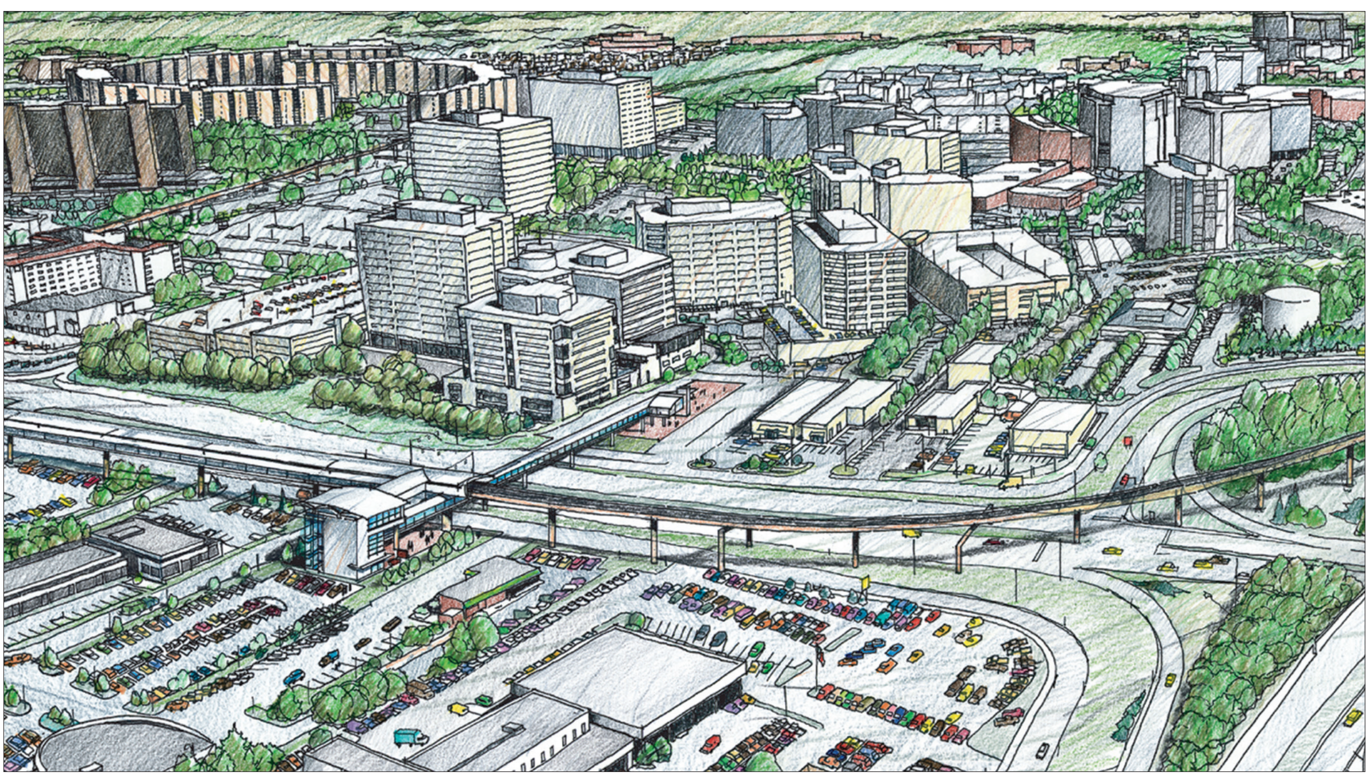
*Based on the Draft EIS, decision-makers, local residents, and the business community will choose among different transportation improvements to secure the future of the Dulles Corridor.*

The location, service characteristics, and design of the facilities all influence the ability of the proposed investments to meet the purpose and need for action in the Dulles Corridor. The Draft EIS provides the opportunity for public discussion of the relative merits of different levels of transportation improvements and investments, or whether any investment is warranted at this time. An important component of this decision process is the identification of how the selected course of action would impact the transportation, social, environmental, and economic context. Additional considerations include the evaluation of what actions would be needed to make a proposed investment consistent with community and natural resource goals.

*The Draft EIS provides information to select among several alternatives - No Action, Bus Rapid Transit (BRT) service, Metrorail service, or a combination thereof, to advance a solution that meets the needs of the Dulles Corridor.*



Typical BRT Stop



Elevated Metrorail Station in Tysons Corner

## PROJECT DESCRIPTION

*The Draft EIS evaluates a range of multi-modal transportation options, including phased implementation of both BRT and Metrorail service, as compared to a "No-Build" (Baseline) condition, to provide a seamless connection to the Metrorail system.*

*The Draft EIS builds on the conclusions of the 1999 Supplement to the Dulles Corridor Transportation Study (MIS), which called for phased implementation of BRT and Metrorail service.*

Bus Rapid Transit - Val de Marne, France

Metrorail - Washington, D.C.

*As extensions of the Metrorail system, all the proposed improvements would have a direct connection to Metrorail.*

The Dulles Corridor Rapid Transit Project will extend the existing Washington Regional Metrorail System to respond to the growing needs of Fairfax and Loudoun counties as well as the region as a whole, and to accommodate increasing travel demand in a manner that enhances regional connectivity and supports economic growth. The alternative transit system enhancements under consideration along the Dulles Corridor would provide a direct connection to the Metrorail system.

The following alternatives are considered in the Draft EIS:

**"Baseline" or "No-Build"** - The Baseline Alternative includes additional investment beyond the existing highway and transit service infrastructure and services within the corridor, and any investments that are committed to be implemented by 2025 aside from the Dulles Corridor Rapid Transit Project. This alternative serves as the basis for comparison and evaluation of the Build Alternatives described below.

**BRT** - BRT is transit service that uses buses operating in a limited access right-of-way to provide amenities typical of rail service, such as enhanced stations and platforms and off-vehicle fare collection. BRT would extend the full length of the Dulles Corridor from the West Falls Church Station on the Metrorail Orange Line to Route 772 in Loudoun County.

**Metrorail** - Metrorail is service like that currently provided by the existing 103-mile regional system, consisting of rapid transit vehicles operating on a dedicated right-of-way. Metrorail would extend the full length of the corridor from a point between the East and West Falls Church Stations on the Metrorail Orange Line to Route 772 in Loudoun County.

*The proposed transit service improvements address both short-term and long-term corridor needs, enhancing regional connectivity, promoting environmental quality, and supporting economic development.*

**Combined BRT/Metrorail** – Metrorail would extend from a point between the East Falls Church and West Falls Church stations on the Orange Line through Tysons Corner, and BRT would operate in the remainder of the corridor, from Tysons Corner to Route 772 in Loudoun County.

**Phased Implementation** – BRT and Metrorail improvements would be implemented beginning with BRT for the length of the corridor. Ultimately BRT would be replaced with Metrorail service, first from the existing Metrorail Orange line through Tysons Corner, and then from Tysons Corner to Dulles Airport, terminating at Route 772 in Loudoun County.

The proposed improvements would generally follow along the Dulles Connector Road, the Dulles Airport Access Road (DAAR), Dulles Toll Road, and the Dulles Greenway, with several alignment design options. Because the Dulles Corridor Rapid Transit Project is envisioned as an extension of the existing Metrorail system, each proposed alternative would include a direct connection to the Metrorail Orange Line. Other elements of the proposed project would include ancillary facilities, such as a Metrorail Service and Inspection (S&I) Yard and a BRT Maintenance and Storage Facility. The highway and transit infrastructure for the Baseline (No-Build) Alternative is also assumed to be completed by others and in place before the Dulles Corridor Rapid Transit Project is implemented.

*Providing transit service on a reserved right-of-way will improve efficiency, reliability, and predictability for travelers in the corridor.*

The implementation of BRT and/or Metrorail service would augment the existing 103-mile Metrorail system by extending improvements into areas that do not currently have transit service functioning in rights-of-way reserved for transit or special uses. The use of such a right-of-way would enable the operation of transit improvements in a reliable and predictable manner by avoiding congestion on the already overburdened roadway system.

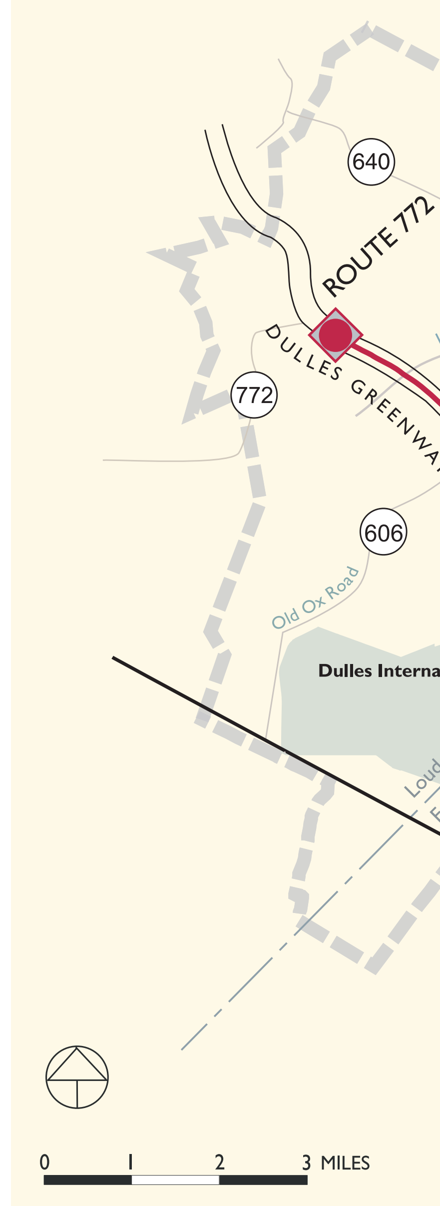
Metrorail in I-66 median.

## BRT

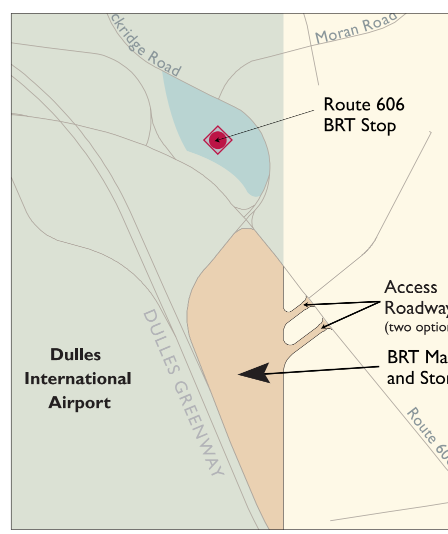
BRT service would generally extend along the Dulles Connector Road, DAAR, Dulles Toll Road, and Dulles Greenway, connecting the West Falls Church Station on the Metrorail Orange Line to Route 772 in Loudoun County. BRT vehicles would travel in the regular traffic lanes of the Dulles Connector Road and in the reserved lanes of the DAAR. In the eastbound direction on the Dulles Connector Road, BRT vehicles would use an exclusive bus lane on the roadway shoulder. In addition, for a limited number of BRT routes, BRT vehicles would also use the high-occupancy vehicle (HOV) lanes of the Dulles Toll Road. At Dulles Airport, BRT vehicles would use the north-south and east-west service roads to access the terminal, and in Loudoun County, BRT vehicles will use the regular travel lanes of the Dulles Greenway.

Three alignment options are under consideration for the BRT Alternative: BRT 1, BRT 2, and BRT 3. Each alignment option would have a different combination of stations and stops. BRT stations would be located in the median of the DAAR, whereas BRT stops would be located at park-and-ride facilities alongside the highway, accessed by BRT vehicles leaving the DAAR or the Greenway. All BRT alignment options would include modifications to the West Falls Church Metrorail Station, minor modifications at Dulles Airport terminal, modifications to existing park-and-ride facilities along the DAAR, in addition to a new BRT Maintenance and Storage Facility. The BRT Maintenance and Storage Facility would be located at Dulles Airport near the Route 606 and Dulles Greenway interchange.

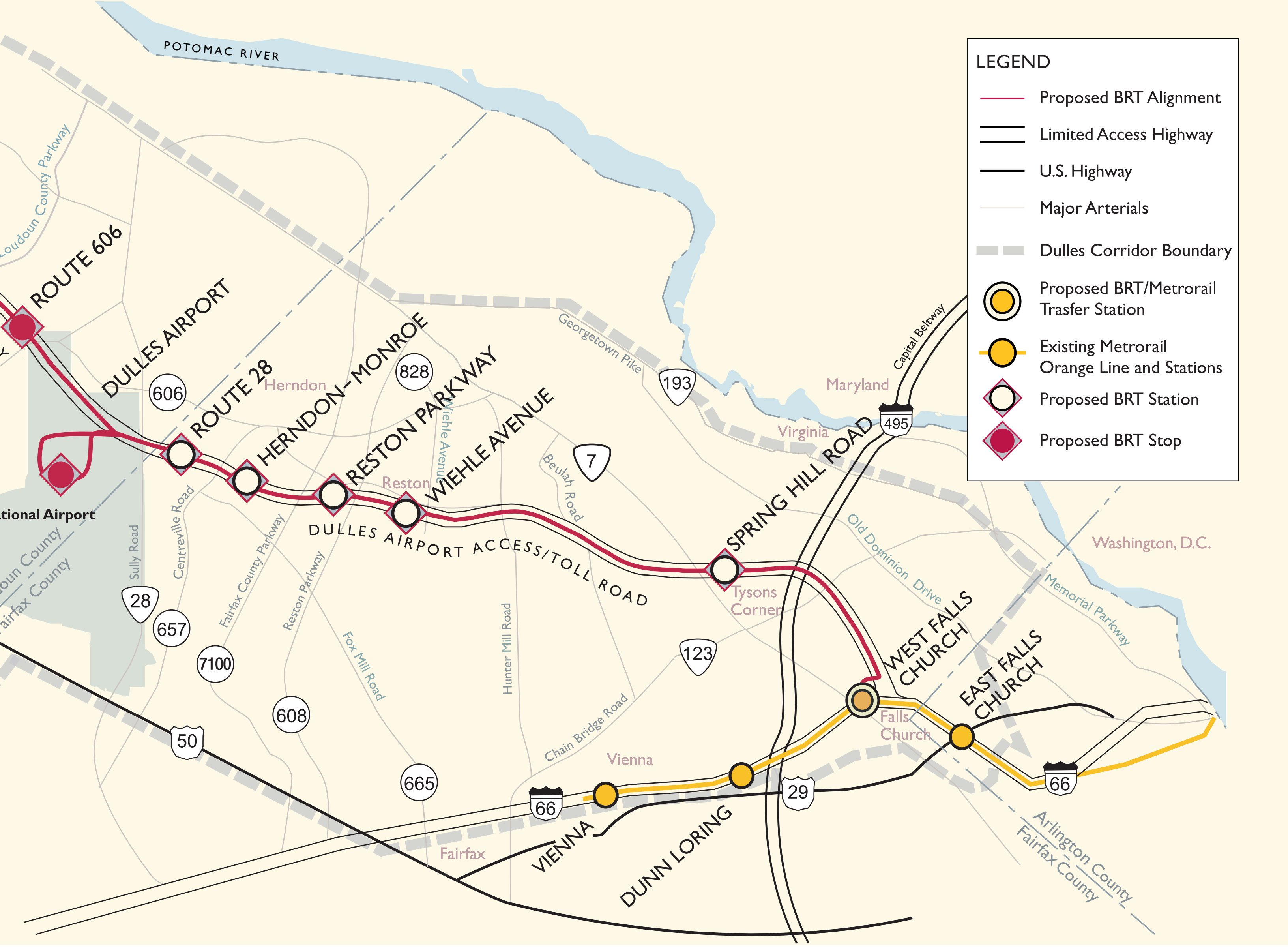
| Bus Rapid Transit | ALIGNMENT OPTIONS BRT1 | BRT2 | BRT3 |
|---|---|---|---|
| NO. OF STATIONS/STOPS | 5 Stations<br>3 Stops | 3 Stations<br>4 Stops | 1 Station<br>6 Stops |
| OPENING YEAR RIDERSHIP (AVERAGE WEEKDAY RIDERS) | 30,300 | 30,100 | 26,900 |
| OPENING YEAR TOTAL NEW RIDERS | 4,500 | 4,400 | 2,200 |
| FORECAST RIDERSHIP (2025) (AVERAGE WEEKDAY RIDERS) | 49,400 | 48,000 | 47,100 |
| FORECAST YEAR (2025) TOTAL NEW RIDERS | 12,500 | 11,400 | 10,900 |
| CAPITAL COSTS W/O FINANCING (YEAR OF EXPENDITURE IN MILLIONS) | $ 481.4M | $ 349.1M | $ 342.7M |
| ANNUAL OPERATING COSTS OPENING YEAR (CHANGE FROM NO-BUILD/BASELINE, YEAR OF EXPENDITURE IN MILLIONS) | $ 20.7M | $ 21.3M | $ 26.8M |

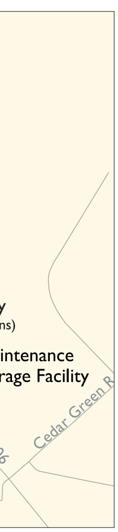


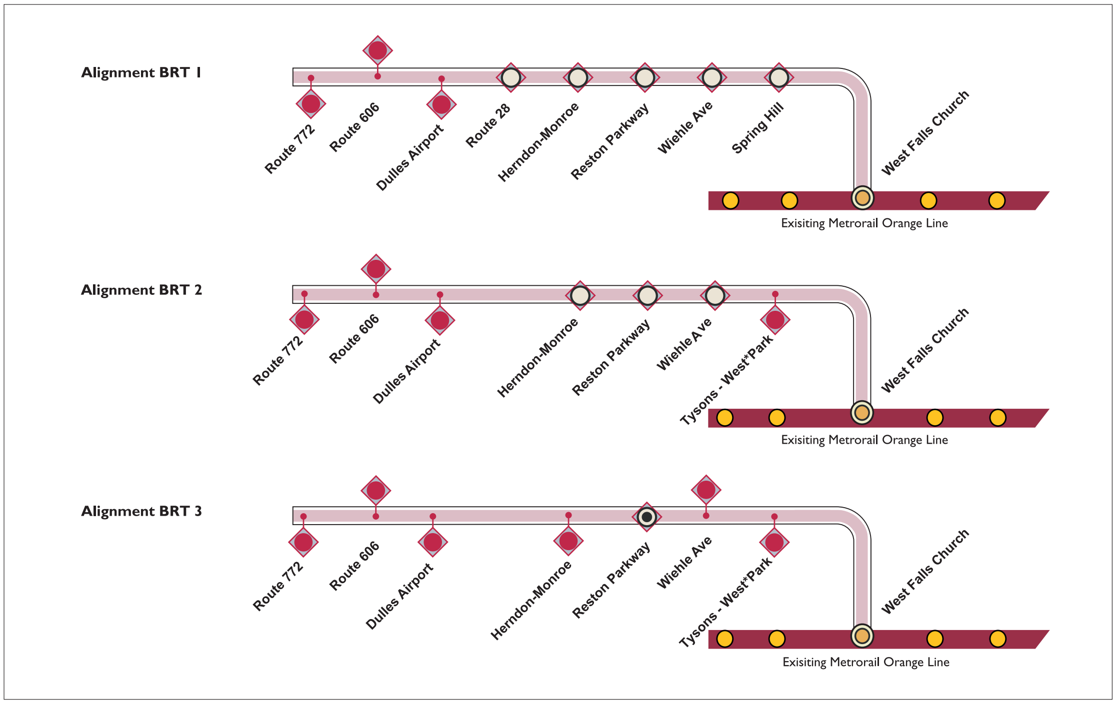
BRT Alignment



BRT Maintenance and Storage Facility



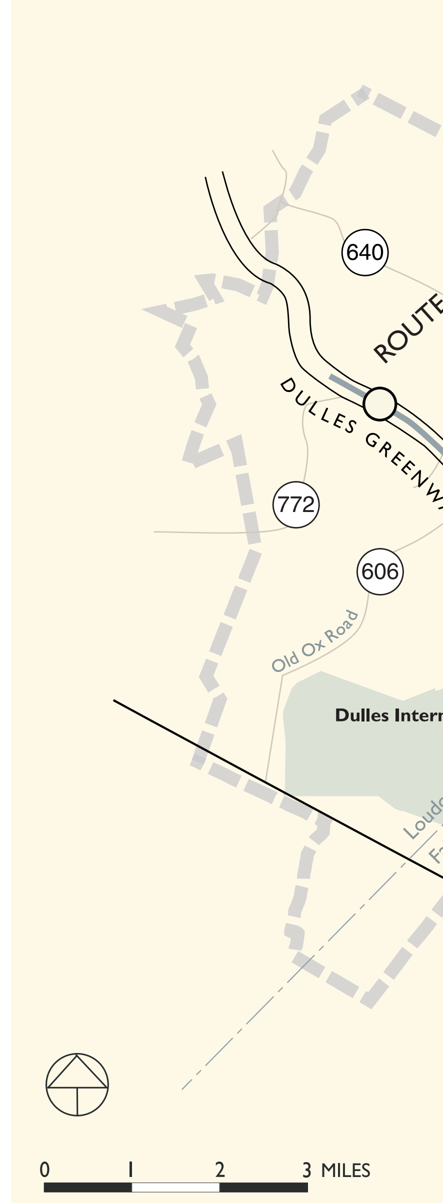



BRT Alignment Options

## Metrorail

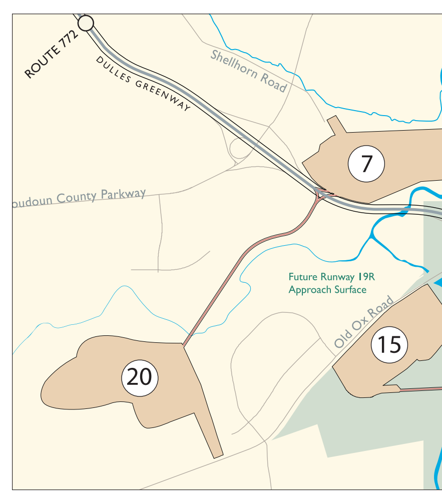
Metrorail improvements would extend beyond the Metrorail Orange Line from a point between the East Falls Church and the West Falls Church stations to Route 772 in Loudoun County, generally using the median of the Dulles Connector Road, the DAAR, and the Dulles Greenway.

The alignment would diverge from these highways to serve Tysons Corner and Dulles Airport. Several possible configurations are under consideration in the Tysons Corner area, including placing portions of the alignment on aerial structure or underground, in addition to the primary at-grade configuration of the DAAR and Greenway portions of the alignment. The alignment from and to the Dulles airport station would also have aerial and underground portions, with the airport station being underground. Four design options (T1, T6, T9, or T4) are under consideration to serve Tysons Corner, with between three and six stations. Metrorail improvements would include from 10 to 13 new stations, as well as ancillary facilities such as a new S&I Yard, the addition of storage tracks to the existing West Falls Church S&I Yard, stormwater ponds, traction power substations, and tie-breaker stations.

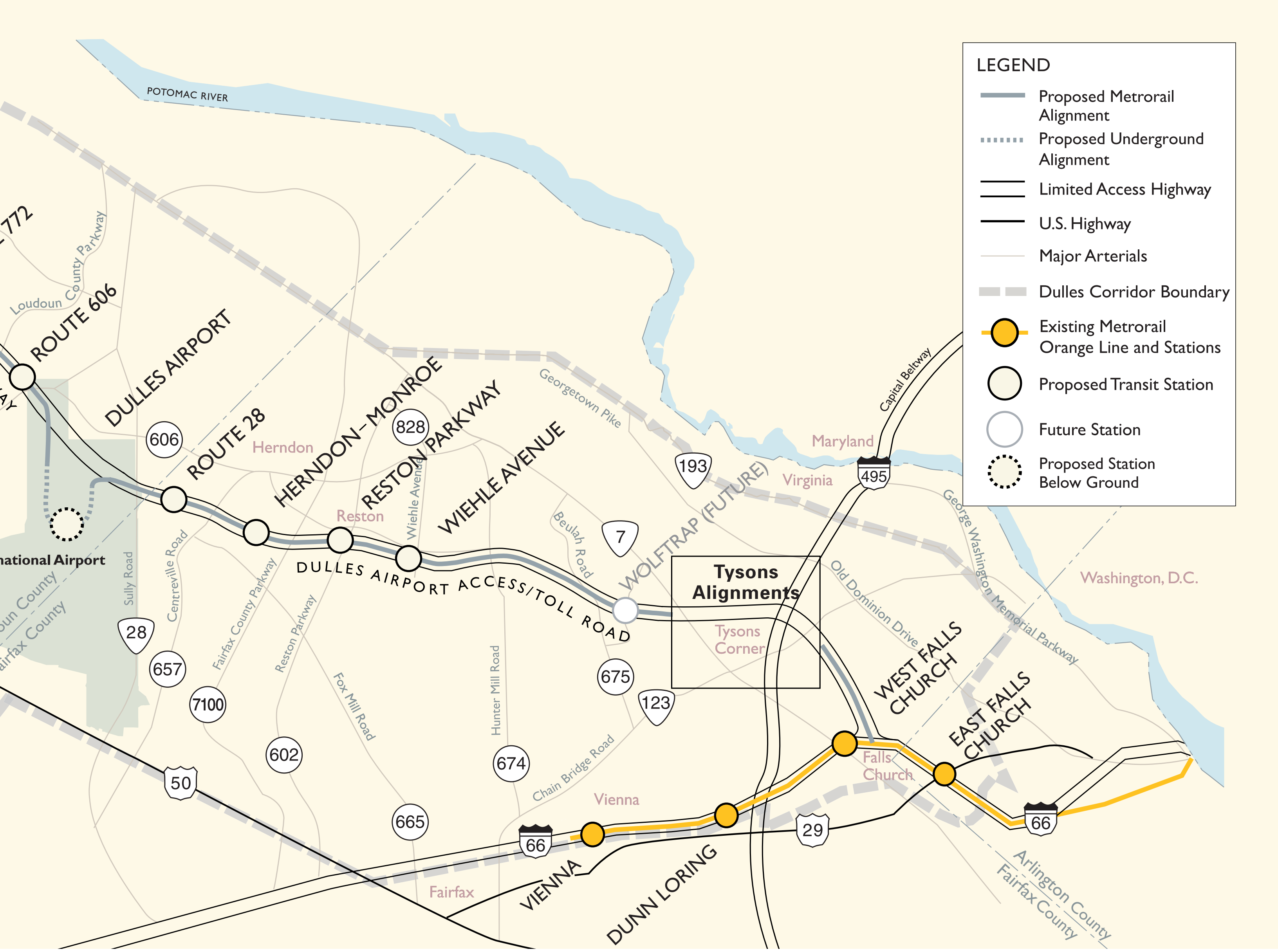


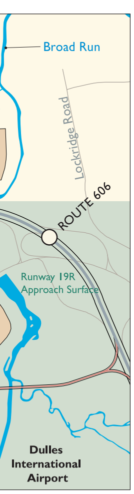
Metrorail Alignment

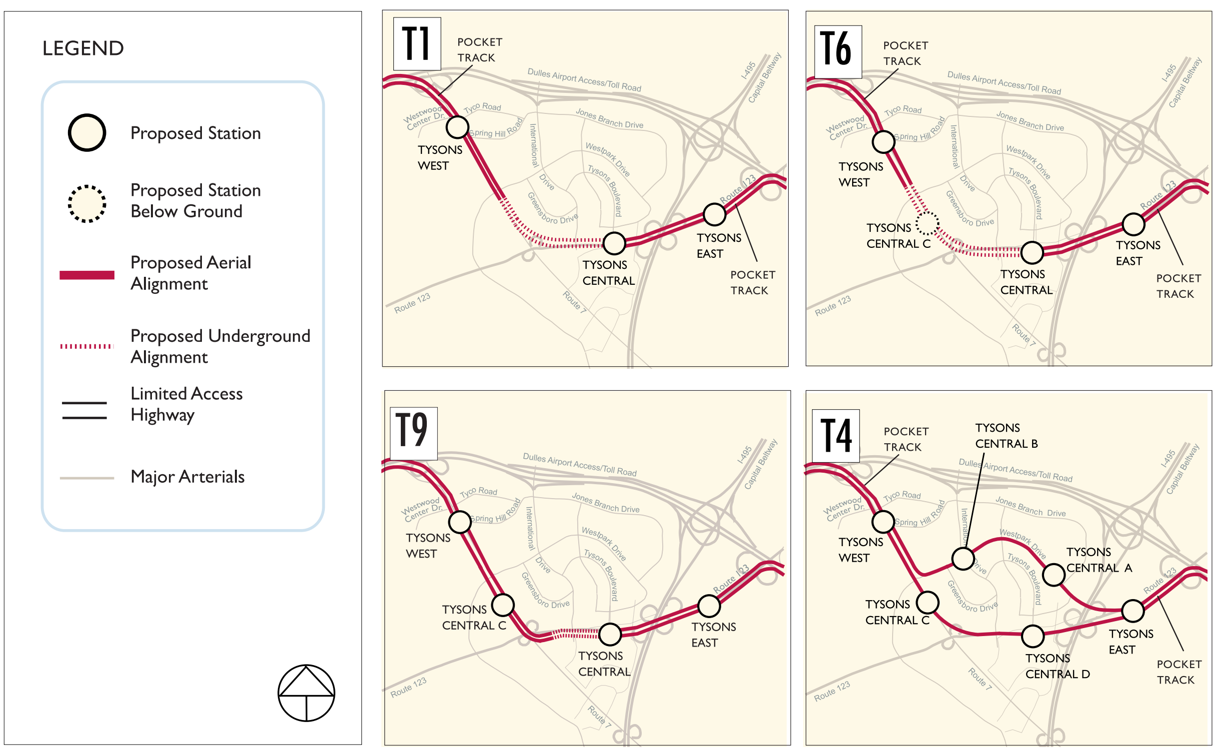
| Metrorail | ALIGNMENT OPTIONS T1 | T6 | T9 | T4 |
|---|---|---|---|---|
| NO. OF STATIONS/STOPS | 10 Stations | 11 Stations | 11 Stations | 13 Stations |
| OPENING YEAR RIDERSHIP (AVERAGE WEEKDAY RIDERS) | 71,300 | 71,900 | 71,900 | 69,400 |
| OPENING YEAR TOTAL NEW RIDERS | 31,600 | 32,700 | 32,700 | 31,400 |
| FORECAST RIDERSHIP (2025) (AVERAGE WEEKDAY RIDERS) | 86,300 | 86,900 | 86,900 | 83,800 |
| FORECAST YEAR (2025) TOTAL NEW RIDERS | 37, 300 | 38,300 | 38,300 | 36,800 |
| CAPITAL COSTS W/O FINANCING (YEAR OF EXPENDITURE IN MILLIONS) | $2,937.3M | $3,101.3M | $2,982.6M | $3,080.4M |
| ANNUAL OPERATING COSTS OPENING YEAR (CHANGE FROM NO-BUILD/BASELINE, YEAR OF EXPENDITURE IN MILLIONS) | $106.7M | $108.3M | $108.3M | $110.8M |



Metrorail Service and Inspection Yard Options




Tysons Alignments

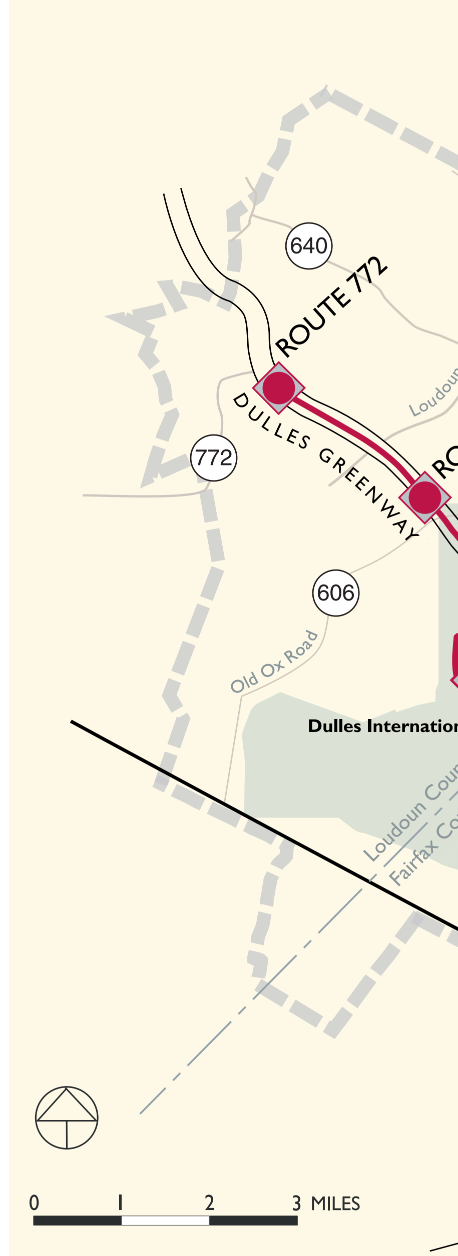
## Combined BRT/Metrorail

The BRT/Metrorail improvements would combine elements of the BRT and Metrorail alternatives. Metrorail would extend from a point between the East Falls Church and West Falls Church stations on the Orange Line through Tysons Corner. Metrorail alignments would serve Tysons Corner (T1, T6, T9, or T4) with three to six stations.

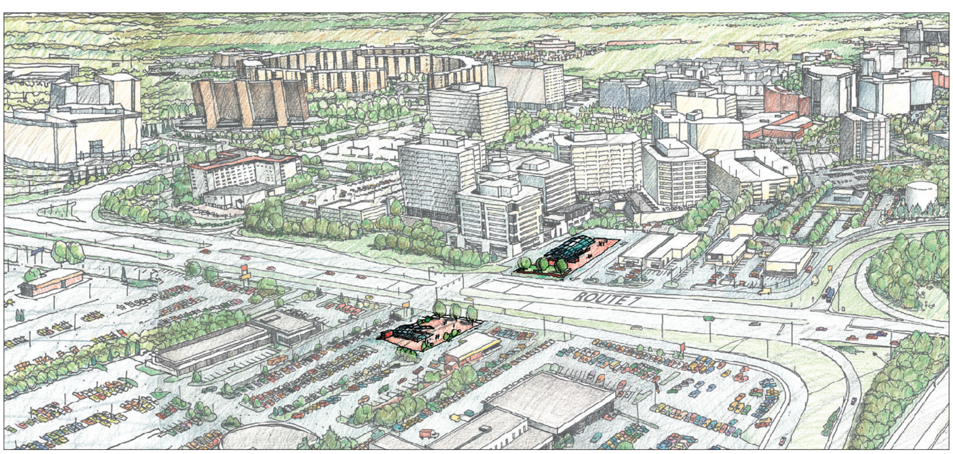
West of Tysons Corner, BRT would operate through the remainder of the corridor to Route 772 in Loudoun County. The number of BRT stations and stops would vary depending on the selected BRT alignment (BRT 1, BRT 2, or BRT 3).

BRT/Metrorail improvements also would include both a new BRT Maintenance and Storage Facility, as well as the addition of storage tracks to the existing Metrorail S&I Yard at the West Falls Church Station. The Metrorail portion of the alternative would include stormwater ponds, traction power substations and tie-breaker stations. This alternative could be developed as an intermediate step in the phased implementation of Metrorail.

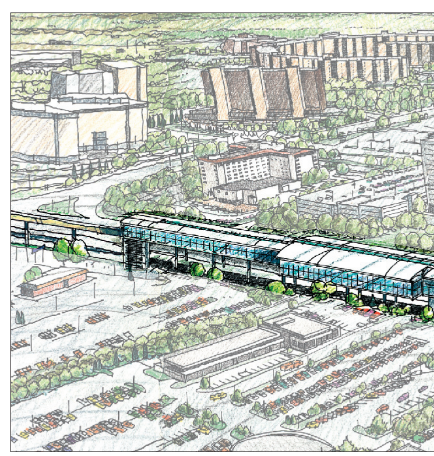
| Combined BRT/Metrorail | |
|---|---|
| NO. OF STATIONS/STOPS | 4 – 10 Stations<br>3 – 6 Stops (Depending on Alignment Options) |
| OPENING YEAR RIDERSHIP (AVERAGE WEEKDAY RIDERS) | 50,800 |
| OPENING YEAR TOTAL NEW RIDERS | 18,800 |
| FORECAST RIDERSHIP (2025) (AVERAGE WEEKDAY RIDERS) | 70,500 |
| FORECAST YEAR (2025) TOTAL NEW RIDERS | 25,100 |
| CAPITAL COSTS W/O FINANCING (YEAR OF EXPENDITURE IN MILLIONS) | $ 1,454.1M |
| ANNUAL OPERATING COSTS OPENING YEAR (CHANGE FROM BASELINE NO-BUILD, YEAR OF EXPENDITURE IN MILLIONS) | $ 53.7M<br>(Includes $16.5M of BRT Costs) |

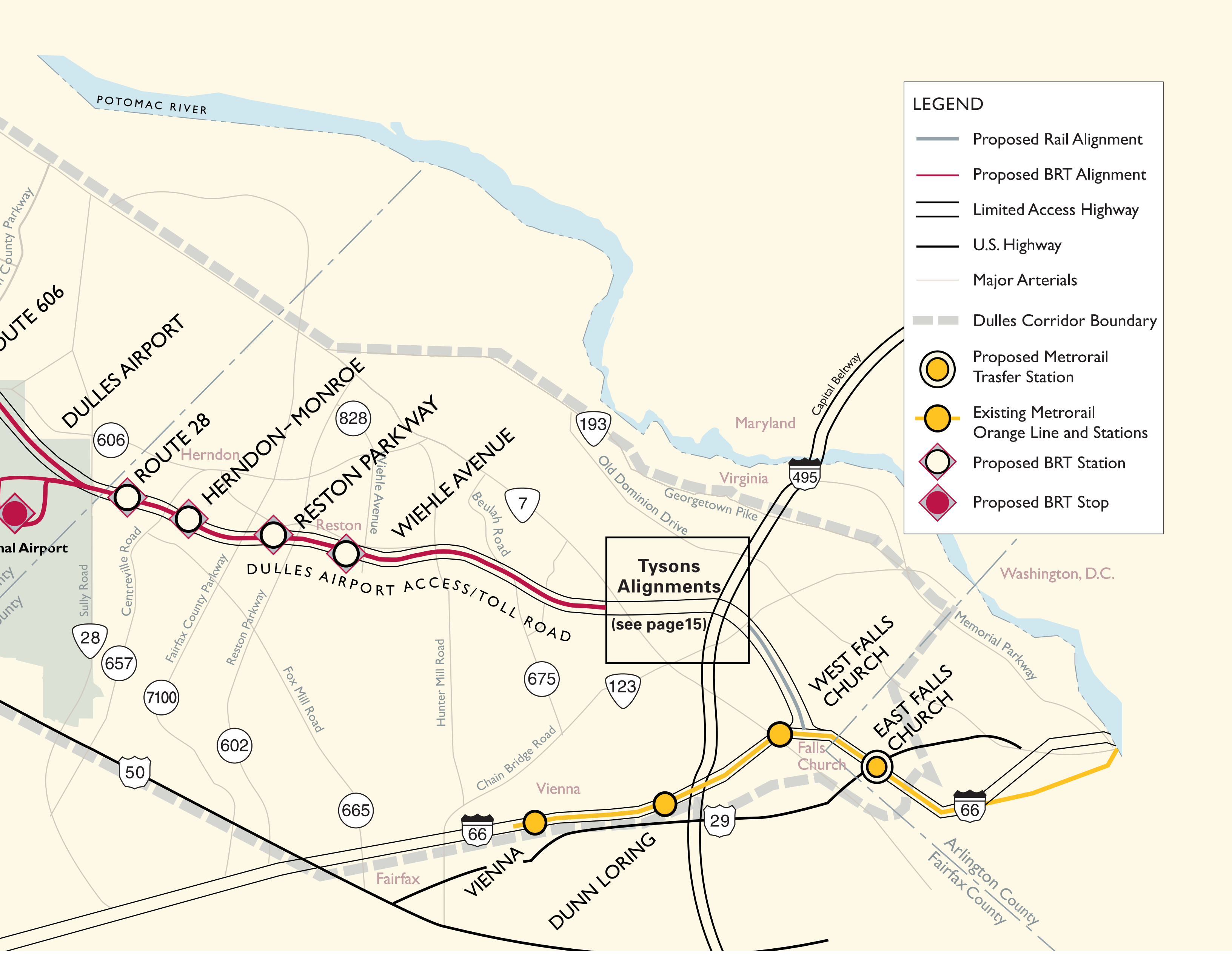


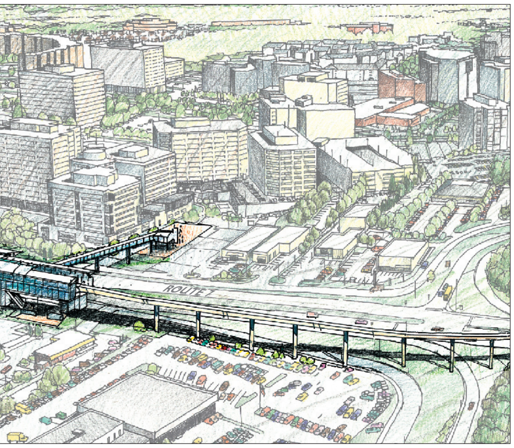
Combined BRT/Metrorail Alignment

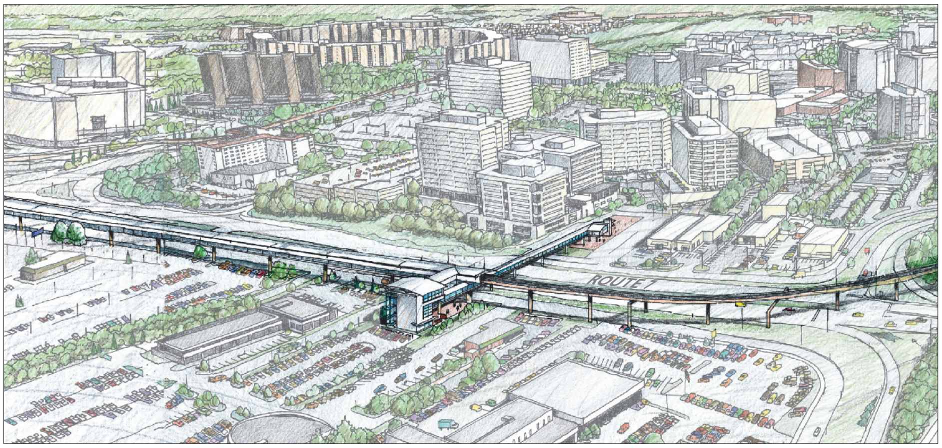


Underground Station in Tysons Corner-Route 7
(Tysons Central C - Alignment T6)


Aerial Double-Track Station in Tysons Corner
Route 7 (Tysons Central C - Alignment T9)





Aerial Single-Track Station in Tysons Corner - Route 7
(Tysons Central C - Alignment T4)

## Phased Implementation

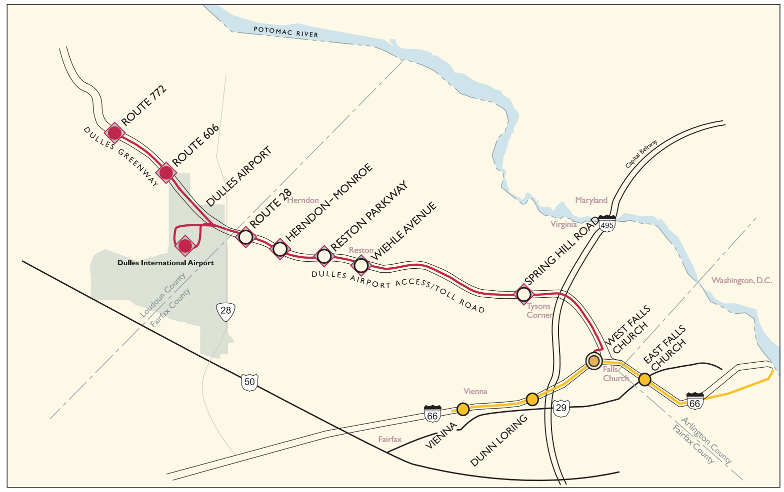
The Phased Implementation Alternative consists of constructing all three Build Alternatives previously described in stages, following the approach recommended in the 1999 *Supplement to the Dulles Corridor Transportation Study*. Under this alternative, BRT would be constructed first from the West Falls Church Metrorail Station to Route 772 in Loudoun County (the BRT Alternative). Subsequently, Metrorail would be constructed between the Orange Line and Tysons Corner, connecting to BRT service between Tysons Corner and Loudoun County (the BRT/Metrorail Alternative). Finally, Metrorail would be constructed between Tysons Corner and Loudoun County, replacing BRT service in the corridor (the Metrorail Alternative). It is anticipated that operations for BRT would begin in 2005, for BRT/Metrorail in 2006, and for Metrorail in 2010.

Like the alignments for the other Build Alternatives, the alignment for the Phased Implementation Alternative would generally follow the Dulles Connector Road, the DAAR, and the Dulles Greenway. Stations, stops and auxiliary facilities would also be the same as those described for the BRT, Metrorail, and BRT/Metrorail alternatives. Initially, a new BRT Maintenance and Storage Facility would be constructed at the western end of the corridor. For the intermediate phase, additional storage tracks would be added to the West Falls Church S&I Yard, and for the full Metrorail phase, a new S&I Yard would be constructed at the western end of the corridor.

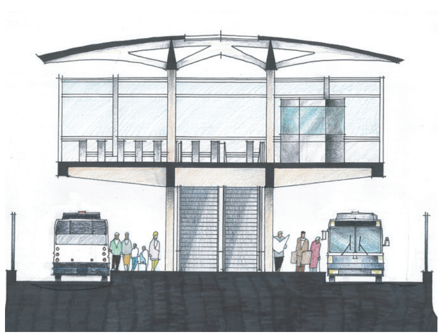
| | PHASES | | |
|---|---|---|---|
| **Phased Implementation** | **BRT** | **BRT/Metrorail** | **Metrorail** |
| NO. OF STATIONS /STOPS (DEPENDING ON ALIGNMENT OPTION) | 1-5 Stations<br>3-6 Stops | 4-10 Stations<br>3-6 Stops | 10-13 Stations |
| OPENING YEAR RIDERSHIP (AVERAGE WEEKDAY RIDERS) | 26,900-30,300 | 50,800 | 69,400-71,900 |
| OPENING YEAR TOTAL NEW RIDERS | 2,200-4,500 | 18,800 | 31,400-31,600 |
| FORECAST RIDERSHIP (2025) (AVERAGE WEEKDAY RIDERS) | — | — | 83,300-86,900 |
| FORECAST YEAR (2025) TOTAL NEW RIDERS | — | — | 31,400-31,600 |
| CAPITAL COSTS W/O FINANCING (YEAR OF EXPENDITURE IN MILLIONS) | $481.4M | $1,050.4M | $1,763.8M<br>Total All Phases: $3,295.4M |
| ANNUAL OPERATING COSTS OPENING YEAR (CHANGE FOR NO-BUILD/BASELINE, YEAR OF EXPENDITURE IN MILLIONS) | $20.7M | $52.9-57.1M | $106.7-110.8M |

LEGEND

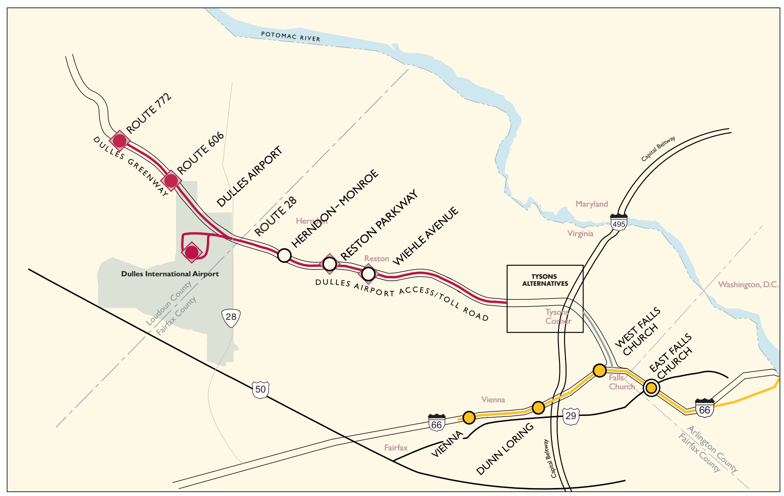
- Proposed Rail Alignment
- Proposed BRT Alignment
- Limited Access Highway
- U.S. Highways
- Major Arterials
- Proposed Metrorail Transfer Station
- Existing Metrorail Orange Line and Stations
- Proposed BRT Station
- Proposed BRT Stop
- Proposed Rail Station



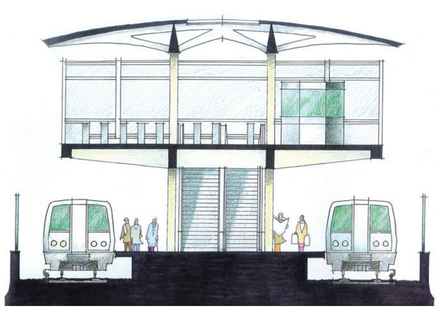

## BRT Phase (BRT I)



BRT




## BRT/Metrorail Phase



Metrorail


## Metrorail Phase

## CHOICES FOR TOMORROW

### Performance of Alternatives

Over the last four decades, the transportation needs of the Dulles Corridor and potential improvements have been the subject of several studies conducted by public agencies and private entities. Most of these studies identified mass transit alternatives as the best transportation solution for the corridor. Numerous land use and regional transportation plans include references to specific Dulles Corridor transit alternatives, supportive land use measures, and potential funding sources.

*Numerous alternatives have been evaluated in studies of the Dulles Corridor over the last 40 years, including a range of different travel modes.*

DRPT initially identified and described alternatives for the Dulles Corridor Rapid Transit Project in the Dulles Corridor Transportation Study, the report documenting a Major Investment Study (MIS) that was completed in 1997. The MIS resulted in recommendations to extend the existing 103-mile Metrorail system through Tysons Corner to Dulles Airport and Loudoun County, and to implement an expanded bus system as an interim solution. In the Supplement to the Dulles Corridor Transportation Study, completed in 1999, the MIS recommendations were revised to consider implementation of transit in four phases: express bus service (Phase I), enhanced express bus service (Phase II), BRT (Phase III), an extension of the regional rail system to Tysons Corner and BRT between Tysons Corner and Loudoun County (Phase IVA), and finally full rail service between Metrorail's Orange Line and Loudoun County (Phase IVB). The Commonwealth Transportation Board (CTB) adopted the revisions described in the Supplement and directed that the revisions be included in the Commonwealth of Virginia's State Transportation Improvement Plan (STIP).

*The 1999 MIS Supplement completed by DRPT recommended Phased Implementation of BRT and Metrorail service.*

The alternatives advanced for detailed evaluation in the Draft EIS were those judged to best achieve the goals and objectives for the corridor, relative to the other alternatives under consideration. Alternatives were assessed in terms of how well they achieved the following objectives:

- Enhanced transportation service;
- Increased transit ridership;
- Supported future development;
- Supported environmental quality;
- Provided cost-effective, achievable transportation solutions; and
- Served diverse populations.

*The Build Alternatives retained for consideration in the Draft EIS were those that best served the needs of the Dulles Corridor.*

The range of alternatives considered included a variety of modes, alignments, stations, and ancillary facilities including maintenance and storage yards.

*Alternatives were eliminated from further consideration based on how well they served business and community transportation needs in the corridor, and how well they "fit" into the transportation, social, environmental and economic context.*

The modal alternatives initially considered included:

- Personal Rapid Transit
- Light Rail Transit (LRT)
- Monorail
- Metrorail
- Bus System Improvements
- BRT
- Express Bus Service

As a result of the previous studies, project scoping, and preliminary screening during the initiation of the preparation of the Draft EIS, the alternatives retained for further, more detailed evaluation focused on BRT and Metrorail improvements, or some combination of both, along with associated maintenance facilities.

*The goals used to measure the performance of alternatives were:*

- *Increase transit ridership*
- *Support future development*
- *Support environmental quality*
- *Provide cost-effective, achievable transportation solutions*
- *Serve diverse populations*

The comparative evaluation of the alternatives for the Dulles Corridor Rapid Transit Project was developed to demonstrate the relative effectiveness of each alternative in meeting the stated project goals and objectives; focus on the essential differences between alternatives and alignment options; and highlight the basic advantages and disadvantages of each. Goals range from improving public transit and broadening the availability of transportation services to supporting future land use development patterns and preserving and enhancing neighborhood and environmental quality. The effectiveness of each of the alternatives in meeting these goals was assessed against a set of evaluation criteria and measures.

Overall, selection of the Baseline (No-Build) Alternative would not support the goals of the Dulles Corridor Rapid Transit Project as well as any of the proposed BRT or Metrorail alternatives, or combinations thereof. Any of these investments would offer a much better level of transit service when compared to the Baseline (No-Build) Alternative, enhancing mobility for corridor residents and employees, especially during midday. Moreover, the Baseline (No-Build) Alternative would be inconsistent with local and regional comprehensive plans, which specifically identify rapid transit improvements in the Dulles Corridor as a critical element in shaping orderly development and meeting regional goals.

*The Baseline (No-Build) Alternative, or taking no additional action, would not be consistent with adopted local and regional plans.*

Phased Implementation would allow the corridor to benefit from improved transportation service as soon as possible in the form of BRT, and it would also provide the mobility benefits associated with Metrorail in the future. On the other hand, Phased Implementation would ultimately cost more than the most expensive of the BRT, Metrorail, or Combined BRT/Metrorail investments. In addition, conversion of BRT 1 or BRT 2 to Metrorail would displace BRT operations from the stations in the DAAR median during conversion, and therefore cause a lengthy suspension of the service benefits provided by these BRT alignments. During conversion, the service provided by BRT 1 and BRT 2 would be more akin to "express bus" type of service.

West Falls Church Metrorail Station

Other key findings relative to the proposed improvements under construction include the following:

**Baseline (No-Build)**

- The Baseline (No-Build) Alternative would not afford enhanced opportunities for economic development, and is not consistent with local and regional plans, which call for transit investment in the corridor.
- The Baseline (No-Build) Alternative would have the fewest short-term environmental impacts, but the least desirable long-term effect on the environment, including transportation, social, economic and environmental factors.


*According to MWCOG, vehicle miles of travel (which is a measurement of how extensively roads are used) is expected to increase 46 percent by 2025. Freeway and arterial lane miles are planned to increase by only 13 percent during that period.*

*BRT would be faster to implement and less expensive to construct than Metrorail, but would serve fewer people less effectively.*

*A major transit capital investment such as Metrorail in the Dulles Corridor would improve transit travel times and make them more competitive with highway travel. Peak period Metrorail travel times are faster than highway times in over one-half of analyzed corridor origination - destination pairs.*

**BRT**

- BRT service can be implemented before Metrorail or Combined BRT/Metrorail.
- BRT does not support land development patterns in Tysons Corner as well as Metrorail, Combined BRT/Metrorail, or Phased Implementation, and cannot penetrate Tysons Corner to effectively serve its workers, shoppers, and residents.
- BRT is less expensive to construct than choices involving Metrorail service.
- BRT would provide less overall passenger capacity than Metrorail.
- BRT does not provide the same level of accessibility for minority and low-income populations to regional job choices that include Metrorail.

**Metrorail**

- Metrorail service generally results in the shortest travel time, especially for reverse commute trips and those that begin and end in Tysons Corner.
- Metrorail service will deliver the highest ridership (more than twice as much as BRT), the highest number of new riders (more than three times as many as BRT), and will result in a higher percentage of people using transit.
- Metrorail would provide a seamless "single-seat" link between Dulles Airport and the region's core, and provides facilities commensurate to the status of this international airport.
- Metrorail service would provide a much greater increase in the capacity to move people through the corridor than either BRT or Combined BRT/Metrorail.
- Metrorail would have higher growth potential in station areas along the corridor due to planned increases in allowable densities at rail stations, and better contributes to the objectives of adopted county master plans.
- More members of the business community, area neighborhood residents, and civic organizations have expressed support for Metrorail than for any other choice.
- Metrorail would provide the best opportunity to capture previous investment made in regional infrastructure.

## Combined BRT/Metrorail

- The combined service is similar in nature to both the BRT and the Metrorail options.
- With Combined BRT/Metrorail, areas that would be served by BRT would not have to wait for rapid transit service as long as they would for Metrorail service.
- Combined BRT/Metrorail blends the benefits of Metrorail service in areas where BRT would not adequately serve development patterns with the benefits of enhanced, more immediate transit service in other areas.
- Combined BRT/Metrorail would provide a greater increase in capacity to move people through the corridor, and would have higher ridership and improved travel times when compared to BRT service alone.

## Phased Implementation

- Phased Implementation would cost the most, but combines the advantages of both BRT and Metrorail service.
- Under Phased Implementation transit service would be introduced in the corridor as soon as possible.
- Phased Implementation would be the most disruptive to the community, traffic and transit service during the conversion of BRT to Metrorail because of the extended construction periods associated with each of the modes, followed by the conversion period.
- Phased Implementation would provide all the long term benefits of Metrorail described above.

Elevated Metrorail Station in Tysons Corner

*Fairfax County land use density bonuses would result in a 17 percent increase in population and a 27 percent increase in employment at transit stations.*

*Implementation of BRT and Metrorail improvements would result in a significant increase in new transit ridership in the region.*

*Phased Implementation of BRT and Metrorail improvements could provide interim BRT services as part of the full extension of the Metrorail System.*

***BRT and Metrorail facilities have been designed to avoid, to the extent possible, impacts to environmental resources and preserve environmental quality.***

*Wolf Trap Run at Wolf Trap Farm Park*

## Environmental Effects

The Build Alternatives were assessed in terms of the potential effects on the existing social, environmental, economic, and transportation conditions in the Dulles Corridor. The social and environmental effects from the project are anticipated to be minor, especially given the length and complexity of the project, because most of the proposed improvements would occur within the medians of the Dulles Connector Road, DAAR, and Dulles Greenway. A notable exception includes the visual impacts of the Metrorail elements on Tysons Corner neighborhoods, which would require mitigation to lessen the extent of these impacts. Overall, the effects of the proposed Build Alternatives are similar in nature. Metrorail and Phased Implementation transit alternatives would have a higher number of displacements, land acquisition, and neighborhood, visual, wetland, floodplain, and noise effects. None of the Dulles Corridor Rapid Transit Project improvements would result in residential displacements.

Residential complex in Tysons Corner

*The potential adverse effects of BRT and Metrorail alternatives are expected to be relatively low given the use of existing transportation rights-of-way.*

In comparison to the Baseline (No-Build) conditions, all of the Build Alternatives are expected to have positive effects on commercial and residential properties located near transit stations, and contribute to more sustainable and transit-supportive economic development by focusing higher-density residential and commercial land uses around the transit stations, especially for alternatives involving Metrorail.

The Dulles Corridor Rapid Transit Project would result in changes to traffic conditions as people change their travel patterns to access the new transit stations, affecting some of the neighborhoods that surround certain stations. Although several neighborhoods would experience such traffic-related effects, these neighborhoods would also directly benefit from the mobility and accessibility that the transit improvements would bring. Neighborhoods surrounding the stations/stops at Spring Hill Road (south side), Wiehle Avenue, Reston Parkway, and Herndon-Monroe would be affected under alternatives involving BRT. Neighborhoods surrounding the Tysons East, Tysons West, Wiehle Avenue, Reston Parkway, and Herndon-Monroe stations would be affected under alternatives involving Metrorail.

*Adjacent communities would benefit from improved mobility and accessibility, but could experience localized increases in traffic volumes.*

*Potential positive effects include:*

- *Air quality benefits*
- *Reduction in traffic congestion*
- *Reinforcement of land use patterns*

Secondary effects related to increased development at transit stations could include effects on neighborhoods, community services, visual and aesthetic conditions, cultural resources, parks and recreation, natural resources, and traffic conditions. The potential for secondary effects is considered low for the BRT Alternative, moderate for the Metrorail and Phased Implementation alternatives, and low for the BRT/Metrorail Alternative. The Build Alternatives will have a low impact on the cumulative effects resulting from other transportation and local improvement projects being implemented at the same time.

The environmental and operational effects differ for each of the Metrorail S&I yard sites under consideration (Sites 7, 15, and 20). Site 20 would be the most consistent with existing and future land use plans. In comparison to Site 7, Site 15 and Site 20 would have greater potential for effects on the natural environment.

*The design of the selected facilities will incorporate mitigation measures to offset unavoidable adverse impacts to the transportation, social, economic and environmental context.*

*Funding for capital costs could be provided through a combination of public and private sector funding.*

## Funding Needs and Strategy

### Capital Costs

FTA, the Commonwealth of Virginia, Fairfax and Loudoun counties, and MWAA would provide capital funding for the Dulles Corridor Rapid Transit Project. In addition, there is the possibility of private funding for portions of the project through implementation of the Commonwealth of Virginia's Public- Private Transportation Act of 1995 (PPTA). Capital costs for the project alternatives are summarized in the table below:

| CAPITAL COSTS WITHOUT FINANCING (YEAR OF EXPENDITURE DOLLARS IN MILLIONS) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| BRT | | | Metrorail | | | | BRT/Metrorail | Phased Implementation |
| BRT1 | BRT2 | BRT3 | T1 | T6 | T9 | T4 | BRT1/T6 | T6 |
| $481.4 | $349.1 | $342.7 | $2,937.3 | $3,101.3 | $2,982.6 | $3, 080.4 | $ 1,454.1 | $ 3,295.4 |

As the project sponsor and federal grant recipient, DRPT intends to request New Starts funding from FTA at 60 percent of the capital costs for BRT and at 50 percent of the capital costs for Metrorail. Participating agencies and their anticipated capital funding sources are:

- FTA (Federal New Starts Funds).
- Commonwealth of Virginia (Virginia Priority Transportation Fund, Dulles Toll Road Surplus Revenues, Public-Private Transportation Act of 1995).
- Fairfax County (Transportation Improvement Tax District, Fairfax County General Obligation Bonds).
- MWAA (Passenger Facility Charges (PFCs)).
- Loudoun County (Business and Professional Occupancy License (BPOL)).

*Federal funding will be requested for 60% of the capital costs for BRT, and 50% of the capital costs for Metrorail.*

The required funding amounts from each jurisdiction vary by alternative. The private sector contributions to funding would be limited to the Metrorail extension, and would not be available for BRT service, based on coordination to date.

### Operating and Maintenance Costs

For purposes of estimating operating and maintenance costs, it was assumed that WMATA would be the leaseholder and operator of the project. Operating revenues will come from a number of sources including: passenger fares, parking, joint development, advertising, concessions, and grants. These services will be subsidized by the approved allocation formulas of the jurisdictions in the WMATA Compact.

*The new transit services would be subsidized by the contributions of WMATA compact jurisdictions.*

Opening year operating and maintenance (O&M) cost estimates for the Baseline (No-Build), BRT and Metrorail improvements were estimated for opening year, and for 2025. The O&M cost estimates shown in the accompanying table are expressed as the incremental increase in cost over the Baseline (No-Build) Alternative in year-of-expenditure (YOE) dollars.

**INCREMENTAL ANNUAL O & M COST OVER THE BASELINE (NO-BUILD) ALTERNATIVE**

| | OPENING YEAR | FORECAST YEAR (2025) |
|---|---|---|
| BRT | $ 20.7-26.8M | $ 54.1-64.2M |
| (BRT COSTS WITHIN ABOVE) | $ 20.2-26.3M | $ 49.3-56.8M |
| METRORAIL | $ 106.7-110.8M | $ 176.5-184.2M |
| BRT/METRORAIL | $ 52.9-57.1M | $ 107.2-114.9M |
| (BRT COSTS WITHIN ABOVE) | $ 16.5M | $ 39.6M |
| PHASED IMPLEMENTATION | $ 20.7M | $ 176.5-184.2M |
| (BRT COSTS WITHIN ABOVE) | $ 20.2M | $ 0.0 |

*The incremental increase in operating and maintenance costs would be higher for alternatives involving Metrorail improvements.*

*Although BRT O&M Costs are lower than those for Metrorail, BRT would provide less capacity.*

The range shown for the BRT and Metrorail alternatives reflects the variation in O&M costs for the different alignment options. The Metrorail O&M costs are higher than the costs associated with BRT and BRT/Metrorail. It is important to note, however, that the BRT Alternative only provides 15 to 30 percent of the peak-hour capacity of Metrorail and its ridership is almost 50 percent lower.

To compare the efficiency of service between the Build Alternatives, annual O&M costs were divided by the number of annual passenger miles projected for the corresponding alternative. The accompanying table summarizes the O&M costs per passenger mile for each of the alternatives.

**O & M COSTS PER PASSENGER MILE IN 2025 (IN 2001$)**

| BRT | | | Metrorail | | | BRT/Metrorail | Phased Implementation |
|---|---|---|---|---|---|---|---|
| BRT1 | BRT2 | BRT3 | T1 | T6/T9 | T4 | BRT1/T4 | T4 |
| $0.264 | $0.263 | $0.263 | $0.268 | $0.270 | $0.271 | $0.267 | $0.271 |

*The costs per passenger mile are similar for all the alternatives under consideration.*

This cost measure indicates that when O&M costs are considered together with the total existing Metrorail system, all of the Build Alternatives generate similar costs per passenger mile.

## Operating Subsidy

The operation of the BRT and Metrorail improvements will require an operating subsidy. The subsidy will vary with the different alternatives. Because of the higher capacity and level of service, Metrorail service will require a greater subsidy than BRT service. An operating subsidy is required from each WMATA Compact jurisdiction to fund the difference between the project's operating revenues and operating maintenance costs.

## COORDINATION OPPORTUNITIES

The Dulles Corridor Rapid Transit Project has been developed and advanced by a partnership of federal, state and local entities as the result of an open and collaborative public discussion of the corridor, its future needs, and potential solutions to transportation demands. The preparation of the Draft EIS was guided by a proactive, responsive public outreach and agency coordination program, with participation from thousands of people with diverse interests from all parts of the corridor, as well as representatives from over 75 federal, regional, state, and local agencies.

To accommodate various degrees of participation and support the decision process, a broad range of outreach techniques was used to define the project purpose and need, design solutions, and assess potential consequences of different actions in terms of transportation, social, economic, and environmental considerations. Comments received focused mainly on the need for a rapid transit investment in the corridor, and how improvements should be designed to avoid and minimize potential effects of construction and operation on adjacent properties and resources.

The Draft EIS is being circulated for review by elected officials, government agencies, and the public, and is available at libraries, information kiosks, project information centers, and community centers prior to the scheduled public hearings. Comments received on the Draft EIS will help shape the future of the project, and will be addressed in the Final EIS.

Members of the public offer comments on alignments

*A partnership of federal, state and local entities, working with area business and residents, have participated in the Draft EIS in order to arrive at a decision for the future of the Dulles Corridor.*

*The public hearings will provide additional opportunities for interested parties to review and comment on proposed improvements.*


Members of the public view project displays.


Tysons Corner

*". . .Dulles already is the principal world gateway to our nation's capital. The highway system alone cannot cope. Mass transit is needed for efficient ground access and to maintain the global image of our capital. . ."*
*Congressmen Wolf, Davis, and Moran to USDOT Secretary Mineta (10/4/2001)*

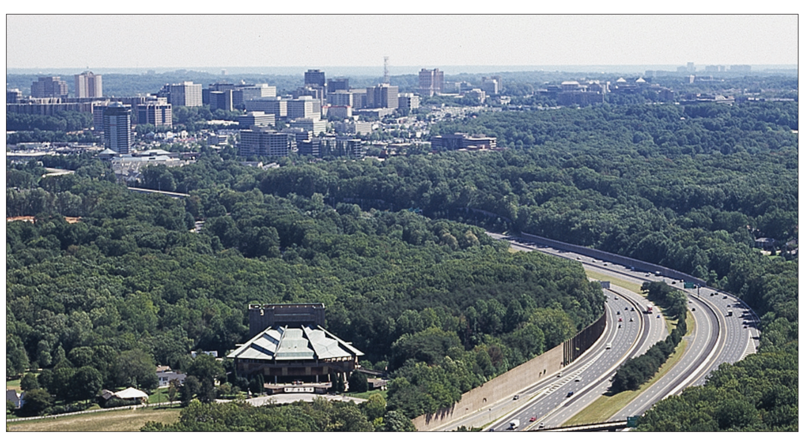
Dulles Connector Road

*A LPA will be selected by Fall 2002, in cooperation with project sponsors, public agencies, the business community, and area neighborhoods.*

## FUTURE ACTIONS

To move forward with a solution for the transportation needs of the Dulles Corridor, following the review of comments received on the Draft EIS, a Locally Preferred Alternative (LPA) for the Dulles Corridor Rapid Transit Project will be selected by Fall 2002. The LPA will be finalized in continued cooperation with federal, state, regional, and local agencies and the public, and will involve the following actions, as appropriate:

- Coordination with local communities to address outstanding issues related to facility design, potential effects, and mitigation.
- Coordination with resource and regulatory agencies to finalize impact assessment and mitigation requirements.
- Coordination with the FAA as a cooperating agency to satisfy FAA's responsibilities under NEPA.
- Coordination among DRPT, WMATA, the Northern Virginia Transportation Commission, MWAA, Fairfax County, and Loudoun County regarding project financial planning and funding.
- Request by DRPT for FTA approval to enter preliminary engineering for any LPA with a Metrorail component.
- Formal LPA recommendation by Fairfax County, Loudoun County, and MWAA.
- Selection of the LPA by the WMATA Board of Directors and by Virginia's CTB.
- WMATA Board modification of the Adopted Regional System to include the LPA.
- Completion of the Final EIS and issuance of a Record of Decision (ROD) by the FTA identifying the action to be undertaken, environmental findings, and mitigation requirements.



# Summary of Build Alternatives:

The Draft EIS provides detailed analysis of the Baseline/No-Build and Build Alternatives. For easy comparison of the Build Alternatives, the following table highlights the results of various analyses presented in the Draft EIS.

| Measures | Build Alternatives | | | |
|---|---|---|---|---|
| | BRT | Metrorail | BRT/Metrorail | Phased Implementation |
| **Transit Operations** | | | | |
| No. of Stations/Stops | 1-5 Stations<br>3-6 Stops | 10-13 Stations | 4-10 Stations<br>3-6 Stops | 10-13 Stations<br>(Metrorail Phase) |
| Opening Year Ridership<br>(Average Weekday Riders) | 26,900-30,300 | 69,400-71,900 | 50,800 | 26,900-30,300 |
| Opening Year New Riders | 2,200-4,500 | 31,400-32,700 | 18,800 | 2,200-4,500 |
| Forecast Ridership 2025<br>Average Weekday Riders | 47,100-49,400 | 83,800-86,900 | 70,500 (BRT1/T4) | 83,800 - 86,900 |
| Forecast Year (2025) New Riders | 10,900-12,500 | 36,800-38,300 | 25,100 | 36,800-38,300 |
| **Costs** | | | | |
| Capital Costs Without Financing<br>(by Year of Expenditure) | $342.7-$481.4M | $2,937.3M-$3,101.3M | $1,454.1M<br>(BRT1/T6) | $3,295.4M<br>(BRT1/T6) |
| Capital Funding Sources | 60% Federal<br>40% Local | 50% Federal<br>50% Local | 52.9% Federal<br>47.1% Local | 51.5% Federal<br>48.5% Local |
| Annual Operating Costs Opening Year<br>(Change from Baseline, Year of Expenditure)<br>BRT Costs Included in Above | $20.7-$26.8M<br><br>$20.2M-26.3M | $106.7-110.8M<br><br>- | $52.9-$57.1M<br><br>$16.5M | $20.7M<br><br>$20.2M |
| Annual Operating Costs Forecast Year<br>(Change from Baseline, Year of Expenditure)<br>BRT Costs Included in Above | $54.1M-64.2M<br><br>$49.3-$56.8 | $176.5-184.2M<br><br>- | $107.2 - $114.9M<br><br>$39.6M | $176.5 - $184.2M<br><br>- |
| **Social Effects** | | | | |
| Consistent with Local Comprehensive Plans | Yes for BRT 1 | Yes | Yes for BRT 1 | Yes |
| Residential Displacements (No.) | 0 | 0 | 0 | 0 |
| Commercial Displacements (No.) | 0 -2 | 2 - 4 | 2 - 6 | 2 - 6 |
| Residential Properties Acquired (No.) | 0 | 8 Partial | 0 | 8 Partial |
| Commercial Properties Acquired (No.) | 4 - 13 | 48 - 72 | 52 - 85 | 54 - 89 |
| Visual Effects | Minor - Moderate | Moderate -<br>Substantial | Moderate -<br>Substantial | Moderate -<br>Substantial |
| Historic Structures | Minor Impacts to<br>3-4 properties | Minor Impacts to<br>3 properties | Minor Impacts to<br>3 properties | Minor Impacts to<br>3 properties |
| **Environmental Effects** | | | | |
| Effect on Geologic Resources | Minor | Minor | Minor | Minor |
| Streams/Water Quality Impacts (Linear Feet) | 96 | 176 | 96 | 176 |
| Wetland Impact (Acres) | 0.12 - 0.58 | 0.12 - 1.22 | 0.12 - 0.58 | 0.12 - 1.22 |
| Floodplain Impacts | 2 | 6 | 4 | 6 |
| Neighborhoods Affected by Noise<br>Before Mitigation (No. above FTA Criteria) | 6 | 12 - 15 | 12 | 12 - 15 |
| Hazardous Materials Sites Potentially Affected | 3 | 22 - 28 | 25 - 31 | 25 - 31 |
| **Economic Effects** | | | | |
| Annual Tax Revenue Loss due to Property<br>Acquisition (2001 Dollars) | $0.45M | $1.42M | $1.28M | $1.42M |
| Station Area Development in 2025 (Change from<br>Baseline, Million Square Feet) | +6.26 - 23.07 | +37.58 - 42.69 | +33.19 - 38.31 | +37.58 - 42.69 |

## For Additional Information:

The Draft EIS contains more information on the topics discussed in this summary. The following table lists the topics and where further details may be found in the Draft EIS.

| Summary Topic | Draft DEIS Chapters | | Draft DEIS Sections | | |
|---|---|---|---|---|---|
| Future Needs and Challenges | Chapter 1 | Purpose and Need | Section | 1.2 | Description of the Region and Corridor |
| | | | Section | 1.3 | Need for Improvements |
| The Decision at Hand | Chapter 1 | Purpose and Need | Section | 1.4 | Goals and Objectives |
| | | | Section | 1.6 | Planning Context |
| Project Description | Chapter 2 | Alternatives Considered | Section | 2.2 | Baseline Alternative |
| | | | Section | 2.3 | Build Alternatives |
| | | | Section | 2.4 | Capital Costs |
| | | | Section | 2.5 | O&M Costs |
| Choices for Tomorrow | Chapter 2 | Alternatives Considered | | | |
| | Chapter 3 | Social Effects | | | |
| | Chapter 4 | Environmental Effects | | | |
| | Chapter 5 | Economic Effects | | | |
| | Chapter 6 | Transportation Effects | | | |
| | Chapter 8 | Financial Analysis | | | |
| | Chapter 9 | Secondary and Cumulative Effects | | | |
| | Chapter 10 | Evaluation of Alternatives | | | |
| Coordination Opportunities | Chapter 11 | Comments, Consultations, and Coordination | Section | 11.1 | Public Involvement |
| | | | Section | 11.2 | Agency Coordination |
| | Appendices | | Section | B | List of DEIS Recipients |
| | | | Section | J | Public Comments and Coordination Summary |
| | | | Section | K | Agency Comments and Coordination Summary |
| Future Actions | | | Section | 1.5 | Role of the Draft EIS in Project Development |

## *Public Hearing:*

*For more information on the dates, time, and location of the public hearing please call the project hotline at 1-888-566-7245 TDD 202-638-3780 or view the project website at www.dullestransit.com.*

## *Comments:*

*Written comments should be mailed to Mr. Corey W. Hill, Northern Virginia Regional Manager, DRPT, 1550 Wilson Boulevard, Suite 300, Arlington, VA 22209 or sent electronically to dullescorridor@aol.com.*

## *For more information:*

*The Draft EIS will be available at the public hearings and also is available for review at the libraries and community centers noted below. The Executive Summary of the Draft EIS may be viewed on the project web site www.dullestransit.com.*

*Arlington Central Library*
*Ashburn Farm Association*
*Broadlands Visitors Center*
*Dolley Madison Community Library*
*Eastern Loudoun Regional Library*
*Fairfax City Regional Library, Virginia Room*
*Falls Church Community Center*
*Falls Church Library*
*Great Falls Community Library*
*Greater Reston Chamber of Commerce*
*Herndon Community Center*
*Herndon Fortnightly Library*
*Lovettsville Library*
*McLean Community Center*
*Middleburg Library*
*Patrick Henry Community Library*
*Purcellville Library*
*Reston Community Center*
*Reston Regional Library*
*Rust Library*
*Sterling Library*
*Thomas Balch Library for Local History*
*Tysons-Pimmit Regional Library*
*Vienna Community Center*

# Purpose and Need for the Proposed Action 1

# 1 PURPOSE AND NEED FOR THE PROPOSED ACTION

This chapter describes the Dulles Corridor and identifies the need for the proposed Dulles Corridor Rapid Transit Project.

**Section 1.1** provides an overview of the Dulles Corridor, the corridor needs, and the proposed project. It also includes a brief introduction of the various sponsoring agencies for the project.

**Section 1.2** defines the boundaries of both the Washington metropolitan region and the Dulles Corridor, and describes key characteristics of both. The activity centers within the corridor are identified, the existing transportation network is described, and the overall travel patterns between the corridor and the region are outlined.

**Section 1.3** discusses the need for transportation improvements in the Dulles Corridor.

**Section 1.4** identifies the goals and objectives of the project, which were used to evaluate the relative merits of all alternatives under consideration in this Draft Environmental Impact Statement (Draft EIS).

**Section 1.5** briefly introduces the alternatives under consideration for the Dulles Corridor Rapid Transit Project.

**Section 1.6** describes the planning context in which the Dulles Corridor Rapid Transit Project was developed, including identification of the various methods used to create public involvement opportunities. In addition to a discussion of previous studies, related studies, and plans, the section includes an overview of the role of this Draft EIS in the decision-making process for the project.

## 1.1 OVERVIEW

The Dulles Corridor, located in Northern Virginia, west of the nation's capital (see Figure 1.1-1) is home to several of the Washington metropolitan region's most dynamic and rapidly growing activity centers. Extending from the vicinity of West Falls Church Metrorail Station in Fairfax County, Virginia to Route 772 in Loudoun County, Virginia the 24-mile corridor includes the high-density office buildings and regional shopping centers of Tysons Corner; the residences, shopping centers, and suburban office complexes of the Reston-Herndon area; the rapidly growing Washington Dulles International Airport (Dulles Airport); and an emerging residential and employment center in eastern Loudoun County, which in recent years has become home to several large technology companies.

With the Dulles Corridor's increasing attractiveness as a place to live and work, travel in the corridor has been steadily growing over the past 15 years. This increasing travel demand has strained the capacity of the existing transportation network, causing delays and increasing travel times between activity centers within the

corridor and the region. The central and eastern portions of the corridor currently experience some of the region's worst traffic congestion.

Over the next 25 years, continued development of the corridor as a regional employment destination, and the maturation of residential communities and commercial areas within the corridor, is expected to far outpace the growth of the region as a whole. Parallel increases in travel demand are projected to exceed the capacity of the corridor's already overburdened transportation system, resulting in gridlock traffic conditions on numerous routes, further degradation of air quality, and a threat to the valued quality of life in the Dulles Corridor.

The ability to expand roadway capacity in the corridor beyond currently planned improvements is limited. Planned roadway enhancements are not expected to relieve the current state of congestion, which is near or at gridlock conditions in many locations. Moreover, the existing corridor transit system offers a poor alternative to auto travel because bus service is also hampered by traffic congestion. Given these factors and a need to reduce auto emissions in the region to meet federal air quality standards, alternative transportation improvements in the Dulles Corridor, such as a high-quality, high-capacity rapid transit line, have long been the focus of public- and private sector studies.

Rapid transit in the Dulles Corridor was initially explored in the 1950s as part of the planning of Dulles Airport. At that time, it was decided to reserve the median of the Dulles Airport Access Road (DAAR) for future transit access to the airport. Subsequently, the need for transit in the corridor was evaluated in the late 1960s during the planning of the regional Metrorail system. While Metrorail's original Adopted Regional System did not include a connection to Dulles Airport, extending rapid transit service to the airport has remained a local and regional goal.

Most recently, providing a rapid transit connection to Dulles Airport was evaluated in the *Dulles Corridor Transportation Study* (1997) and the *Supplement to the Dulles Corridor Transportation Study* (1999). The former, a Major Investment Study (MIS), recommended developing a rail line between the Metrorail Orange Line and Route 772 primarily using the median of the DAAR. The MIS Supplement in 1999 recommended developing this rail line through a phased implementation program that would begin with enhanced express bus services, then use bus rapid transit (BRT) technology to institute rapid transit service in the Dulles Corridor as quickly as possible. BRT is an emerging transit mode in which buses are used to provide high-quality service akin to a rapid rail system. The BRT line would then be converted to rail use as project development progressed.

To advance these recommendations and respond to the continued need for transportation improvements in the Dulles Corridor, the Commonwealth of Virginia, in partnership with the Washington Metropolitan Area Transit Authority (WMATA) and the Federal Transit Administration (FTA), prepared this Draft EIS to document the evaluation of alternative transit improvements for the corridor, known as the Dulles Corridor Rapid Transit Project. As the agency responsible for improving and promoting public transportation services in the Commonwealth, the Virginia Department of Rail and Public Transportation (DRPT) is sponsoring the Dulles Corridor Rapid Transit Project. To support the development of preliminary engineering and the Draft EIS, DRPT has entered into an agreement with WMATA to serve as the technical lead for the project. FTA is the lead federal agency for the project and the Draft EIS was completed with the Federal Aviation Administration (FAA) as a cooperating agency.

The purpose of the Dulles Corridor Rapid Transit Project is to provide high-quality, high-capacity transit service in the Dulles Corridor. The introduction of fixed-guideway transit to the corridor is intended to offer

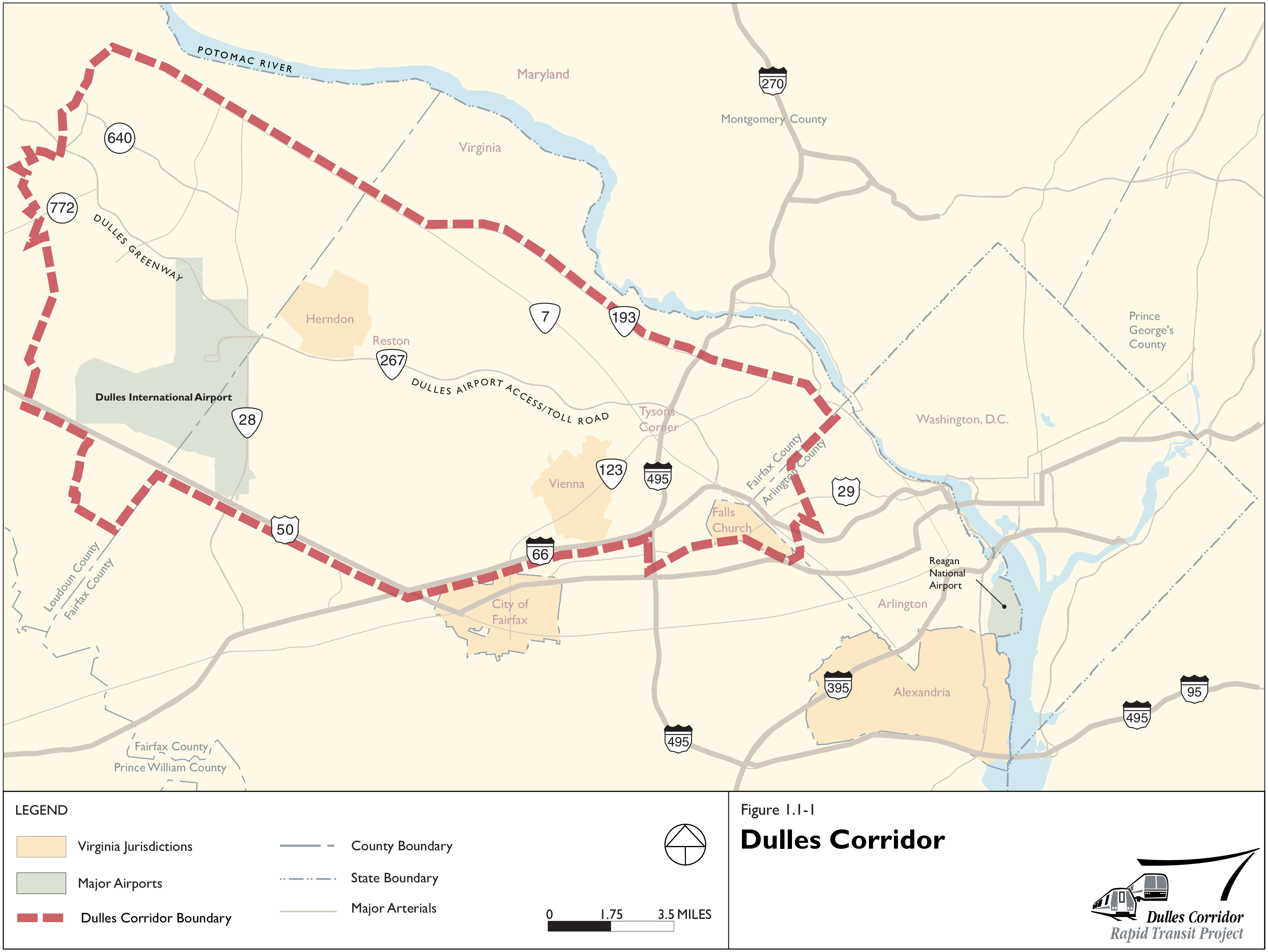



Figure 1.1-1

# Dulles Corridor

Dulles Corridor Rapid Transit Project

travel time savings between the corridor and the region's core, expand the reach of the region's existing rapid transit system, offer a viable alternative to auto travel for commuting and discretionary trips in the corridor, support future development, assist in meeting the region's air quality goals, and serve diverse populations.

Alternatives under consideration include a BRT Alternative, a Metrorail Alternative, an alternative that combines these modes, and a Phased Implementation alternative, in which these three alternatives are implemented through a staged program of rapid transit improvements. The relative merits and potential impacts of these improvements, as compared to a No-Build or Baseline Alternative, are described in this document.

The Dulles Corridor Rapid Transit Project is identified in the *Transportation Equity Act for the 21st Century* (TEA-21) as one of the candidate projects to receive federal funding from FTA. Under the *National Environmental Policy Act of 1969* (NEPA), as amended, the environmental consequences associated with all alternatives for such a project must be identified and assessed to assist decision-makers in evaluating the relative merits of the project (as compared to a No-Build or Baseline Alternative) and in selecting a preferred alternative. Consequently, this Draft EIS was prepared to assist the Commonwealth, WMATA, FTA, FAA, local and regional decision-makers, and the public in evaluating the potential effects of the alternatives for the Dulles Corridor Rapid Transit Project and in selecting a Locally Preferred Alternative.

## 1.2 DESCRIPTION OF THE REGION AND CORRIDOR

From a small collection of communities along the Potomac River, the Washington metropolitan region has grown to an internationally prominent region of more than 4 million people and 2 million jobs. The region has a diversified employment base, with the second-highest concentration of information technology firms in the United States. The region continues to experience growth, with a population increase in the last decade of more than 8.5 percent, including more than 200,000 immigrants.

Much of the region's growth is occurring along suburban corridors in Maryland and Northern Virginia. One of the most important and rapidly developing areas in Northern Virginia is the Dulles Corridor, which is characterized by a variety of residential communities, office complexes, retail centers, and a mix of educational, recreational, and leisure facilities.

### 1.2.1 REGION AND CORRIDOR BOUNDARIES

For the purposes of discussion in this Draft EIS, the "region" is defined as the District of Columbia; the Virginia jurisdictions of Arlington County, City of Alexandria, Fairfax County, City of Fairfax, City of Falls Church, Loudoun County, Prince William County, City of Manassas, City of Manassas Park, and Stafford County; and the Maryland jurisdictions of Calvert County, Charles County, Frederick County, Montgomery County, and Prince George's County (see Figure 1.2-1). This definition is consistent with that used by Metropolitan Washington Council of Governments (MWCOG) in their growth forecasts for the region. The region's core includes the central portion of Washington, D.C.

Northern Virginia forms the western portion of the Washington metropolitan region (see Figure 1.2-1). The Northern Virginia Transportation Coordinating Council defines Northern Virginia as the jurisdictions of Arlington, Fairfax, Loudoun, and Prince William counties; the independent cities of Alexandria, Fairfax, Falls Church, Manassas, and Manassas Park; and the towns of Dumfries, Herndon, Leesburg, and Vienna.

The Dulles Corridor is located in Northern Virginia, and is defined as the east-west corridor extending from the vicinity of the West Falls Church Metrorail Station in Fairfax County to Route 772 in eastern Loudoun County. The 24-mile corridor is primarily located in the northern part of Fairfax County. Together, the DAAR, Dulles Toll Road, and the Dulles Greenway serve as the corridor's central axis.

### 1.2.2 CORRIDOR ACTIVITY CENTERS

Several major activity centers are located throughout the Dulles Corridor (see Figure 1.2-2). These activity centers include major employment and commercial centers surrounded by low- to medium-density residential development, as well as tourist destinations and educational facilities.

#### 1.2.2.1 Falls Church

The City of Falls Church is located 9 miles west of Washington, D.C. and has well-established residential, shopping, and office developments. The Northern Virginia campuses of the University of Virginia and the Virginia Polytechnic Institute (Virginia Tech) Graduate Center are located near the West Falls Church Metrorail Station. Currently, the East Falls Church and West Falls Church stations on the Metrorail Orange Line provide transit access from Falls Church to the core of the region. However, transit access to the Dulles Corridor is limited to express and local bus service, mostly from the West Falls Church Station.

#### 1.2.2.2 Tysons Corner

Tysons Corner, the "downtown" of Fairfax County, lies adjacent to the Capital Beltway (I-495) between the Dulles Toll Road and Route 7 (Leesburg Pike). Today, Tysons Corner is larger, in both geographic size and employment, than many of the central business districts in major U.S. cities, and is one of the largest suburban business districts in the country. Approximately 90,000 people work and 14,000 people live in approximately 3 square miles at Tysons Corner. By 2025, Tysons Corner is projected to provide nearly 126,000 jobs and grow to 19,000 residents.

More than 32 million square feet of commercial and retail space have been developed in Tysons Corner. With Tysons Corner Center and Tysons Galleria as its centerpieces, Tysons Corner has emerged as a regional shopping center. These shopping complexes house more than 330 stores and 3.5 million square feet of retail space, attracting 1.9 million visitors annually. Currently more than 8 million square feet of new development is under construction or in the planning phase in the core of Tysons Corner.

#### 1.2.2.3 Reston, Herndon, and Dulles Corner

The planned community of Reston is located in northwestern Fairfax County, 5 miles east of Dulles Airport. Reston encompasses 7,400 acres and in 2000 had a population of more than 63,000 people. Commercial facilities are clustered along three main arteries—Reston Parkway, Sunrise Valley Drive, and Sunset Hills Road—all with easy access to the Dulles Toll Road. While Reston Parkway is a north-south road, Sunrise Valley Drive and Sunset Hills Road run parallel to the Toll Road roughly between Hunter Mill Road and the Fairfax County Parkway.

Within the Dulles Corridor, Reston has emerged as a center for high-technology firms and residential development. The area has the second largest amount of office development in Fairfax County (Tysons Corner has the largest), and Reston Town Center has more than 50 shops and restaurants, a multiplex theater, an outdoor ice rink, a 514-room hotel, and almost 1 million square feet of office space. Additional high-intensity development is planned for the Town Center.


Figure 1.2-1

# Washington Metropolitan Region and Northern Virginia

Dulles Corridor Rapid Transit Project

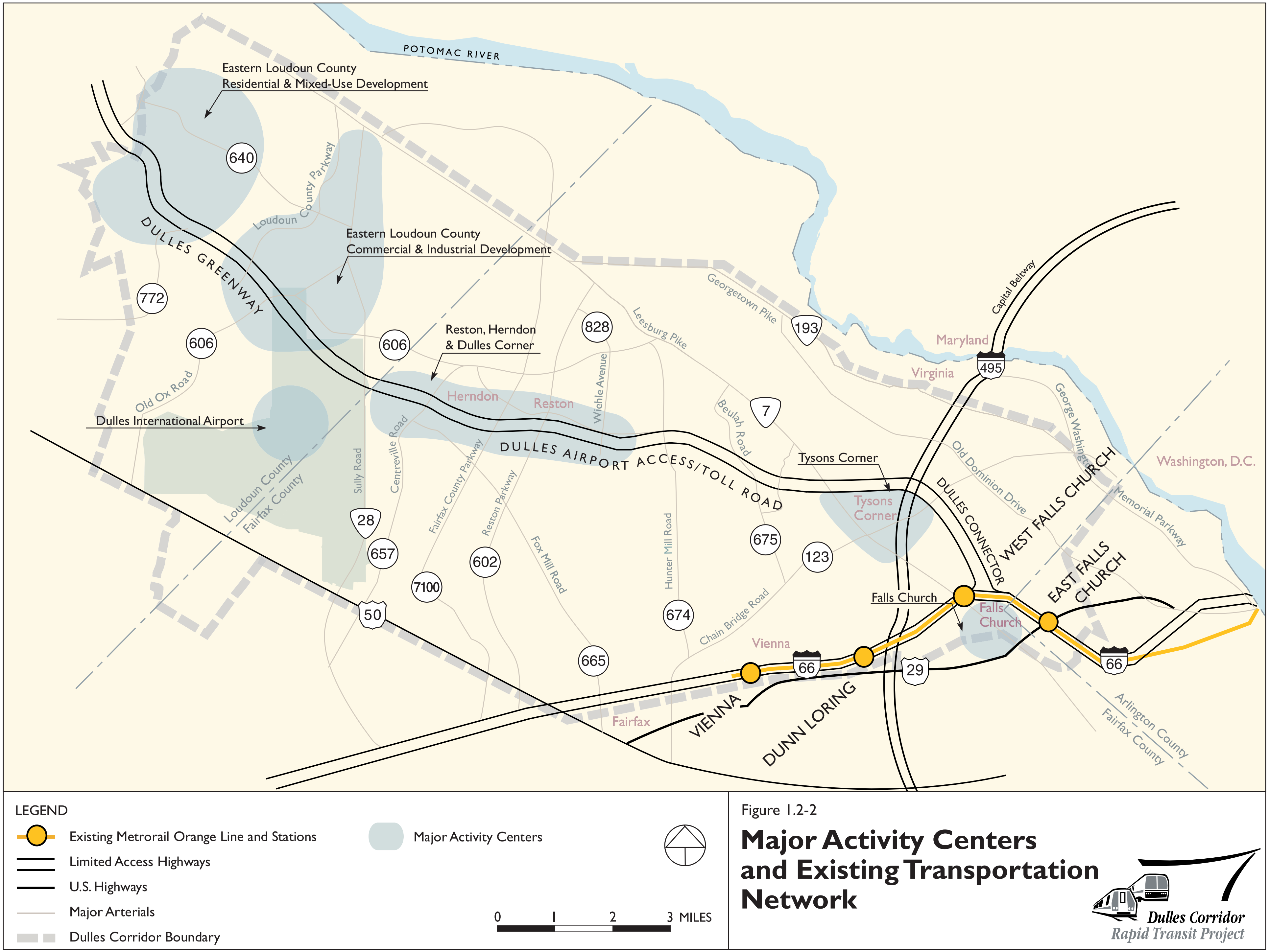



Figure 1.2-2

# Major Activity Centers and Existing Transportation Network

The Town of Herndon is located in northwestern Fairfax County, 3 miles east of Dulles Airport, and occupies 2,337 acres. Herndon has experienced increased growth in the last decade, and has maintained a balance of commercial, residential, and recreational components. Growth is projected to continue, with a build-out potential for Herndon commercial properties in excess of 30 million square feet of floor space.

Dulles Corner is an emerging activity center located at the interchange of the Dulles Toll Road and Route 28. New developments planned for the area include Dulles Station, a mixed-use development project located on 63 acres directly south of the Toll Road and east of Route 28. Fairfax County approved Dulles Station for transit-oriented development consisting of 1.5 million square feet of office space and 1.2 million square feet of space for multi-family residential use. The development will be centered on a planned transit parking area. In addition, more than 9 million square feet of non-residential development is planned for Dulles Corner as part of the Dulles Suburban Center, which is identified in the adopted Comprehensive Plan for the area.

The Reston, Herndon, and Dulles Corner areas of Fairfax County are projected to grow to more than 144,000 residents and to provide 118,000 jobs by 2025. While many Herndon and Reston residents work in this growing technology hub, most still commute daily to other areas of the region, such as southern Fairfax County and the regional core (downtown Washington, D.C. and eastern Arlington, VA communities such as Rosslyn). In addition, many of the Reston-based businesses draw their employees from southern Fairfax County and the outer Northern Virginia suburbs.

#### 1.2.2.4 Dulles Airport

Dulles Airport is an 11,000-acre, full-service, international airport with more than 450,000 annual domestic and international flights to accommodate passengers and air cargo. Over the last five years, activity at Dulles Airport has grown steadily, with a 25 percent increase in total passenger volume and a 22 percent increase in domestic and international airfreight volume. Dulles Airport was the fastest-growing large airport in the world in 1999 with a 26 percent annual growth rate. More than 20 million passengers used the airport in 2000; this number is expected to grow to 32 million annual passengers by 2010. By 2025, more than 1 million metric tons of international and domestic freight are forecast to be loaded or unloaded at Dulles Airport. Although the rate of growth at the airport stabilized in 2000, and may temporarily decrease following the events of September 11, 2001, it is still anticipated that the airport's design capacity of 55 million annual passengers (boardings) will be reached by 2035.

Dulles Airport currently employs more than 15,400 people. As airport passenger and cargo operations increase, employment is projected to increase as well. By 2010, it is anticipated that more than 30,000 people will be employed at the airport. By 2035, employment is expected to increase to 65,000 people.

Dulles Airport has expanded to accommodate the rapid increase in passengers, and more construction is planned in the future. Expansion of the terminal to twice its former size was completed in 1996, and two new concourses were opened in 1998 and 1999. In 2000, the Metropolitan Washington Airports Authority (MWAA) launched a six-year, $3.4 billion capital construction program. The program includes construction of an underground people mover between the main terminal and concourses, additional public parking, a new concourse, and a new runway.

The Smithsonian's National Air and Space Museum Steven F. Udvar-Hazy Center is currently under construction on the south end of the airport property. The museum will be a 700,000-square-foot facility on a 176-acre site, and is scheduled to open in 2003. The Smithsonian estimates that three million people will visit the museum annually. This number is projected to increase to five million annual visitors within a few years.

#### 1.2.2.5 Eastern Loudoun County

Over the past 10 years, Loudoun County, in the westernmost portion of the Dulles Corridor, has experienced substantial growth spurred by the high-tech industry. America Online/Time Warner, WorldCom, and Orbital Sciences have added a total of 7,350 jobs to the eastern portion of the county. Nearly 50 percent of these jobs are located in Ashburn, home to the WorldCom campus. The campus is currently in the second phase of development and employs 3,300 people.

Most of the commercial development in Loudoun County is focused along Route 28, between Dulles Airport and Route 7. Due to its proximity to the airport, this area also includes a large amount of industrial development. In total, eastern Loudoun County is planned to include 9.2 million square feet of industrial space. There are a number of industrial parks to the north of Route 606 and the airport, the largest of which is the Beaumeade Corporate Park. This industrial park has more than 1.8 million square feet of office and industrial development already in place and is approved for a total of 3.5 million square feet in the future. A number of smaller office and industrial developments (existing and planned) are located closer to Route 606.

In addition to job growth, Loudoun County has been experiencing extensive population growth. Between 1990 and 1999, the county's population grew at a rate of roughly seven percent per year, making it the fastest-growing county in Virginia and one of the fastest growing counties in the nation. Much of this residential growth has occurred north of the Dulles Greenway and west of the Route 28 corridor.

Future development is planned for the residential communities of Ashburn Village and Ashburn Farm, which will have more than 9,000 homes and nearly 23,000 residents when completed. Other planned residential developments, which will include a mix of land uses, are Belmont, Broadlands, and Brambleton. Together these communities will include more than 11,000 homes, as well as substantial office and retail development. Much of this future residential and mixed-use development will be concentrated along the Dulles Greenway, west of the Route 28 corridor.

### 1.2.3 CORRIDOR TRANSPORTATION SYSTEM

The transportation system in the corridor includes the existing roadway and transit networks. The diverse roadway network ranges from limited access highways to local streets. The transit network includes services from several providers, but is primarily limited to bus transit.

#### 1.2.3.1 Roadway Network

The heart of the Dulles Corridor roadway network is the east-west transportation facility formed by the Dulles Connector Road, the Dulles Airport Access Road, and Dulles Toll Road in Fairfax County, and the Dulles Greenway in Loudoun County (see Figure 1.2-2). The Dulles Connector Road is a four-lane, limited-access facility that links the Toll Road with Interstate 66 east of the Capital Beltway (Interstate 495). The Dulles Toll Road is an eight-lane toll facility that provides direct access between the Capital Beltway, eastern Loudoun County, and various activity centers in between. The Connector Road and the Toll Road are owned and operated by the Virginia Department of Transportation (VDOT). The DAAR is located in the median of the Toll Road and is reserved for travelers with business at Dulles Airport, including air passengers, air-freight customers, and employees. In peak periods, this roadway also provides access for express buses serving Fairfax County and Dulles Airport. The DAAR is owned by the United States government, but is operated by MWAA under a long-term lease agreement with FAA. The Dulles Greenway is a four-lane privately owned

toll facility that connects to the Toll Road at Route 28 and extends to the Route 7 Bypass east of Leesburg. Together, the Toll Road and the Greenway form Route 267.

Other regionally essential roadways include Interstate 66 (I-66), Interstate 495 (I-495, Capital Beltway), Route 7 (Leesburg Pike), Route 123 (Chain Bridge Road/Dolley Madison Boulevard), Route 193 (Georgetown Pike), Route 7100 (Fairfax County Parkway), Route 28 (Sully Road), Route 50 (Lee-Jackson Memorial Highway), and the Loudoun County Parkway. Route 7 and Route 193 form the northern boundary of the corridor, while I-66 and Route 50 form the southern boundary. These roadways are primarily oriented east west. I-495, Route 123, Route 7100, and Route 28 provide north-south passage through the corridor, connecting to its northern and southern boundaries, and, in most cases, extend beyond the corridor.

With the exception of Route 193 and portions of the Loudoun County Parkway, which have two lanes in some locations, these regional roadways are limited-access freeways or arterial routes with at least four lanes. Portions of I-66, Route 7, Route 123, Route 50, and Loudoun County Parkway have six lanes, and Route 28 has six lanes throughout. I-495 is an eight-lane facility. Nearly all of these regional roadways are planned for expansion within the next 10 years.

Other key roadways in the corridor that provide access to the DAAR, the Dulles Toll Road, and the Greenway include Hunter Mill Road, Wiehle Avenue, Reston Parkway, Centreville Road, and Route 606. These roads primarily serve local travelers in north and central Fairfax County and eastern Loudoun County. Hunter Mill Road provides north-south access through most of the corridor, roughly extending between Route 7 in the north and I-66 in the south. Similarly, Reston Parkway allows north-south travel through the corridor, extending between Route 7 and the southern portion of Reston, where it briefly becomes Lawyers Road, then merges into Route 608 (West Ox Road), and eventually connects to Route 50 at the southern end of the corridor. Centreville Road and Route 606 serve travel in the vicinity of Dulles Airport, extending between the Town of Herndon and Route 50. Centreville Road serves travelers on the east side of the airport, whereas Route 606 runs along the northern and western edges of the airport.

Two other roadways of note are Sunset Hills Road and Sunrise Valley Drive. These collector roadways parallel the Dulles Toll Road, and provide access to neighborhoods and office complexes bordering the Toll Road. To some extent, Sunset Hills Road and Sunrise Valley Drive represent alternatives to the Toll Road through Reston.

#### 1.2.3.2 Transit Network

Existing transit services within the Dulles Corridor include Metrorail and Metrobus operated by WMATA, express and local buses provided by Fairfax County, and express buses provided by Loudoun County. These transit services are integrated with transit centers and park-and-ride lots throughout the corridor.

##### WMATA

WMATA is the Washington metropolitan region's primary public transportation provider. Created in 1967 through a Congressionally approved interstate compact, WMATA is the public agency responsible for planning, developing, constructing, and operating the regional rail and bus transit systems. The agency now operates a multi-branch network stretching nearly 1,500 square miles through the District of Columbia, Arlington County, Fairfax County, the City of Alexandria, and the City of Fairfax in Virginia; and Montgomery and Prince George's counties in Maryland—an area encompassing approximately 3.2 million residents.

Metrorail is the rapid rail component of WMATA's public transportation system (see Figure 1.2-3). With 103 miles of track and 83 stations, the Metrorail system connects major activity centers within the region's urban core to those within and beyond the Capital Beltway. The system also links to the two regional commuter rail systems: Virginia Rail Express (VRE) and the Maryland Rail Commuter (MARC) service. In 2000, the Metrorail system carried approximately 571,000 weekday passengers. The Metrorail Orange Line serves the southeastern portion of the Dulles Corridor, with stations at East Falls Church, West Falls Church, Dunn Loring, and Vienna (see Figure 1.2-2). These stations primarily serve travel to and from the region's core, and do not adequately serve travel within the Dulles Corridor.

Metrobus, WMATA's regional bus system, operates 322 routes. Systemwide, Metrobus carried 484,000 daily passengers in 2000. Currently, 14 Metrobus routes operate in the Dulles Corridor, primarily providing service between Tysons Corner, the corridor Metrorail stations, and areas to the south and east. Several of the routes also provide feeder service to the Ballston and Rosslyn Metrorail stations in Arlington. One route provides express service between downtown Washington, D.C. and Dulles Airport, with stops at the Tysons-West*Park Transit Station and the Herndon-Monroe Park-and-Ride. Though some routes operate with 20- or 60-minute headways, most operate with 30-minute headways during the peak period. Many corridor buses are frequently delayed by heavy traffic congestion in Tysons Corner and elsewhere in the region.

### Fairfax County

Fairfax County provides public transportation via the Fairfax Connector bus system. The system includes 54 regular routes operating throughout the county, some of which provide connections to Falls Church, Arlington, and Alexandria. The Fairfax Connector service also includes four Reston Internal Bus Service (RIBS) routes, which provide circulator service within the Reston-Herndon area. Fairfax Connector had 20,500 average weekday boardings systemwide in 2000.

The Dulles Corridor is served by 30 of the Fairfax Connector routes. This service includes express bus service operating in the DAAR and Dulles Toll Road, RIBS circulator service in Reston-Herndon, and circulator services operating within Tysons Corner. Overall, peak service frequencies range from 15 minutes to 60 minutes. In 2001, Fairfax Connector ridership in the corridor was on average approximately 10,000 weekday passengers.

### Loudoun County

Current Loudoun County service is somewhat limited due to the county's overall rural character. Nonetheless, the County contracts to provide 11 peak-period express bus trips from the eastern part of the county to Rosslyn, the Pentagon, the State Department, and other locations in downtown Washington, D.C. Service from Loudoun County previously operated from five park-and-ride lots located in shopping centers throughout eastern Loudoun County.

To replace these facilities, VDOT recently opened the 750-space Dulles North Transit Center at the north end of Dulles Airport near the Route 606/Dulles Greenway interchange. Loudoun County's express bus service currently serves about 800 average weekday passengers.

### Transit Centers

An important element of the existing Dulles Corridor transit service is the network of bus transit centers and park-and-ride lots. Overall, there are 10 bus transit facilities in the corridor, including the Dulles North Transit Center, the Herndon-Monroe Park-and-Ride lot in Herndon, 3 park-and-ride lots in Reston (Reston South,


LEGEND

- Red Line • Glenmont to Shady Grove
- Orange Line • New Carrollton to Vienna/Fairfax-GMU
- Blue Line • Franconia-Springfield to Largo Town Center
- Green Line • Branch Ave to Greenbelt
- Yellow Line • Huntington to Mt Vernon Sq/7th St-Convention Center

Station in service
Planned station
Transfer station
Virginia Railway Express
AMTRAK
MARC
Commuter Rail
Parking



Figure 1.2-3

# Regional Metrorail System

Dulles Corridor
Rapid Transit Project

Reston East, and Reston North), and the Tysons-West*Park Transit Station in Tysons Corner, among others. Most of these transit centers provide short-term parking or Kiss & Ride spaces for passengers being dropped off or picked up, and seven centers also provide all-day parking for commuters. Commuter parking is in heavy demand at the eastern end of the corridor. As a result, the parking facilities at the East Falls Church and West Falls Church Metrorail stations, and at the Reston East Park-and-Ride near the Wiehle Avenue/Dulles Toll Road interchange, are nearly full on an average weekday.

### 1.2.4 TRAVEL PATTERNS

Historically, the largest segment of travel in the Washington metropolitan region consisted of work travel between suburban homes and jobs in the urban core, and discretionary trips within suburban residential areas. However, the growth in employment and retail development in the Maryland and Northern Virginia suburbs has changed the patterns in which people commute, shop, and travel. Regional travel currently includes a growing number of suburb-to-suburb work trips, core-to-suburb work trips, and discretionary trips to regional entertainment and shopping centers in the suburbs.

As one of the major suburban employment and retail centers in the region, the Dulles Corridor attracts work trips from residences in the core and other suburban areas, as well as shopping and entertainment trips to venues such as Tysons Corner Center, Tysons Galleria, and Wolf Trap Farm Park. Corridor travel also includes traditional trips from residences in the corridor to jobs in the urban core, trips to work centers in other suburban areas, and discretionary trips from residences to nearby shopping and services.

Though corridor-related trips are projected to increase from 2.2 million to 3.4 million trips per day, only minor changes in travel patterns are expected within the corridor, because most of the employment and population growth in the corridor is planned for existing and emerging activity centers. The existing and expected patterns for corridor-related travel are summarized in Tables 1.2-1 to 1.2-3. These tables do not present information on travel to and from various areas within the corridor; rather, travel patterns are shown for the corridor as a whole.

**Table 1.2-1: Total Corridor-Related Travel**

| Movement | Percentage of Corridor-Related Trips | | | |
|---|---|---|---|---|
| | 2000 | | 2025 | |
| Within Corridor | 880,000 | 40% | 1,380,000 | 41% |
| Between Corridor and Fairfax Other | 660,000 | 30% | 870,000 | 26% |
| Between Corridor and Virginia Other | 280,000 | 13% | 630,000 | 19% |
| Between Corridor and Arlington, Core | 210,000 | 10% | 290,000 | 9% |
| Between Corridor and Montgomery, Other | 140,000 | 7% | 220,000 | 6% |
| **Corridor-Related Trips** | **2,170,000** | **100%** | **3,390,000** | **101%** |

Trip totals are rounded to the nearest 10,000 and percentages are rounded to the nearest percent. As a result, some totals do not equal 100 percent.

"Fairfax Other" includes those portions of Fairfax County that are not part of the Dulles Corridor. "Virginia Other" includes the City of Alexandria, outlying portions of Loudoun County, and other outlying Virginia counties. "Core" includes the central portion of Washington, D.C. "Montgomery" is Montgomery County, Maryland. "Other" includes other portions of Maryland and portions of Washington, D.C. outside the core.

Source: Projections prepared using MWCOG Round 6.2 Cooperative Forecasts.

**Table 1.2-2: Corridor-Related Work Travel**

| Movement | Percentage of Corridor-Related Trips | | | |
|---|---|---|---|---|
| | 2000 | | 2025 | |
| Between Corridor and Fairfax Other | 130,000 | 30% | 180,000 | 26% |
| Within Corridor | 100,000 | 23% | 180,000 | 26% |
| Between Corridor and Virginia Other | 80,000 | 19% | 170,000 | 25% |
| Between Corridor and Arlington, Core | 70,000 | 16% | 90,000 | 13% |
| Between Corridor and Montgomery, Other | 50,000 | 12% | 70,000 | 10% |
| **Corridor-Related Work Trips** | **430,000** | **100%** | **690,000** | **100%** |

Trip totals are rounded to the nearest 10,000 and percentages are rounded to the nearest percent. As a result, some totals do not equal 100 percent.
Source: Projections prepared using MWCOG Round 6.2 Cooperative Forecasts.

**Table 1.2-3: Corridor-Related Work Travel by Transit**

| Movement | Percentage of Corridor-Related Trips | | | |
|---|---|---|---|---|
| | 2000 | | 2025 | |
| Between Corridor and Arlington, Core | 24,000 | 60% | 34,000 | 59% |
| Between Corridor and Fairfax Other | 6,000 | 15% | 8,000 | 14% |
| Within Corridor | 4,000 | 10% | 7,000 | 12% |
| Between Corridor and Montgomery, Other | 4,000 | 10% | 6,000 | 10% |
| Between Corridor and Virginia Other | 2,000 | 5% | 3,000 | 5% |
| **Corridor-Related Work Trips by Transit** | **40,000** | **100%** | **58,000** | **100%** |

Trip totals are rounded to the nearest 1,000 and percentages are rounded to the nearest percent. As a result, some totals do not equal 100 percent.
Source: Projections prepared using MWCOG Round 6.2 Cooperative Forecasts.

### 1.2.4.1 Overall Travel

The majority of travel in the Dulles Corridor is between points within the corridor or between the corridor and other parts of Northern Virginia. According to estimates prepared by the project team, based on MWCOG projections of population and employment, approximately 40 percent of all corridor-related travel in 2000 was between homes and activity centers within the corridor. An additional 30 percent of corridor-related travel was between the corridor and the southern portions of Fairfax County, and approximately 13 percent was from the outer Virginia suburbs (including western Loudoun, Prince William, Fauquier, and Stafford counties, and other outlying jurisdictions) to the corridor. Approximately 10 percent of corridor-related trips were to and from Arlington County and the regional core, while the remaining 7 percent of trips were to and from the Maryland suburbs and Washington, D.C.

In the next 25 years, these patterns are expected to change very little, though the number of trips is expected to increase considerably, especially between the corridor and the outer Virginia suburbs. Travel within the corridor is projected to remain the largest share of corridor-related travel. The next largest share of corridor-related travel is expected to be to and from other parts of Northern Virginia, though the percentage of trips to other parts of Fairfax County is expected to decrease to 26 percent, while the share of trips to and from the outer Virginia suburbs is expected to increase to 19 percent.

Travel to and from the Dulles Corridor is currently spread fairly evenly among the various activity centers. Vienna and the southern parts of the corridor produce a slightly larger share of trips due to the greater

concentration of residential developments in these areas. Trips go to and come from all parts of the corridor and the region, but most trips in the corridor begin and end within one activity center or involve travel between neighboring activity centers.

Though the travel patterns between the Dulles Corridor and the rest of the region are not expected to change much in the next 25 years, the distribution of trips within the corridor is expected to shift. In contrast to the current distribution, which is fairly uniform, it is expected that by 2025 the emerging activity center in eastern Loudoun County will generate and attract a substantial portion of trips in the corridor, increasing from a 17 percent share of corridor-related trips to a 32 percent share. The overwhelming majority of these trips would either begin and end in eastern Loudoun County or involve travel between eastern Loudoun County and the rest of the outer Virginia suburbs, but eastern Loudoun County is also expected to attract an increasing number of trips from elsewhere in the corridor.

Dulles Airport draws travelers from the entire region, including air passengers, airport employees, and freight carriers. Based on 1998 MWAA traffic counts, approximately 60 percent of the airport traffic uses the DAAR, and 40 percent of travelers access the airport via Route 28. As the overall number of trips to the airport vicinity increases, the share of traffic coming from the Route 28 corridor is also expected to increase.

#### 1.2.4.2 Work Travel

A key component of the overall travel patterns for the Dulles Corridor is work travel. Work trips most directly influence the effectiveness of the transportation system, because they tend to be limited to the morning and evening peak periods, resulting in the maximum traffic volumes experienced by the system.

For current corridor-related work travel, the largest movements are between the corridor and the southern portions of Fairfax County (30 percent) and between residences and jobs within the corridor (23 percent). Nearly 60 percent of the trips between the corridor and southern Fairfax County are from residences in the county to jobs in the corridor; corridor residents who work in the county make the remaining 40 percent. Approximately 19 percent of corridor-related work travel consists of trips between the outer Virginia suburbs and the corridor; most of these trips are from residences in the outlying areas to jobs in the corridor. Corridor residents who are employed in western Arlington and the regional core make another 16 percent of corridor-related work trips, and the remaining 12 percent are between the corridor and the Maryland suburbs and non-core portions of Washington, D.C.

By 2025, it is expected that corridor-related work travel patterns will shift slightly. Jobs within the corridor are expected to attract an increasing share of corridor residents and residents of the outer Virginia suburbs. At the same time, the share of work trips between the corridor and other portions of Fairfax County is expected to decrease. Likewise, it is anticipated that the share of corridor residents attracted to jobs in the region's core will decrease.

In 2000, nearly 30 percent of all the work trips attracted to the Dulles Corridor went to Tysons Corner. The remaining trips were distributed uniformly between employment centers in Reston, Herndon, Dulles Airport, eastern Loudoun County, and the southern portion of the corridor near Vienna. By 2025, the anticipated growth in eastern Loudoun County is expected to cause a shift in the distribution of work travel within the corridor. The largest share of corridor work trips (28 percent) is expected to go to eastern Loudoun County and the Tysons Corner share of the market will decrease to 25 percent, though the absolute number of trips to both places are expected to increase substantially (from 45,000 to 132,000 daily trips in Loudoun County, and from 85,000 to 118,000 daily trips in Tysons Corner). Reston and Vienna are also expected to attract a smaller

share of corridor work trips. The majority of the eastern Loudoun County employees are expected to live in that portion of the corridor or in the outer Virginia suburbs.

#### 1.2.4.3 Work Travel by Transit

Currently, few corridor residents and employees use transit to travel to work. Based on estimates prepared using the Northern Virginia Major Investment Study Model (NVMISM) and the recent MWCOG population and employment forecasts, only 12 percent (30,000 trips) of the work trips beginning in the corridor are made using transit, and an even smaller percentage of travelers commuting to jobs in the corridor use transit (5 percent or 10,000 trips).

Corridor residents who work in western Arlington and the region's core are far more likely to use transit for their commute than other travelers in the Dulles Corridor. For work travel, residents of the Dulles Corridor who work in western Arlington and the core make 60 percent of all corridor-related transit travel. The next largest share of this travel market are work transit trips between the corridor and southern Fairfax County (15 percent), most of which are made by county residents who work in the corridor. Corridor residents who also work in the corridor make an additional 10 percent of work transit trips. This pattern is not expected to change considerably by 2025, in the absence of the proposed project.

About 53 percent of the corridor-related work transit trips are associated with the West Falls Church and Vienna areas, most likely due to the presence of Metrorail. Most of these trips are made by residents of these areas, rather than by employees. Approximately 23 percent of corridor-related work transit trips are to and from Tysons Corner; however, employees of Tysons Corner rather than residents mostly make these trips. Residents in the Reston area generate an additional 11 percent of work transit trips in the corridor.

For the baseline condition in 2025, the overall number of work trips made by transit is expected to increase by close to 20,000 trips per day, but the patterns of transit travel are not expected to change substantially. Only 47 percent of the corridor-related work transit trips in 2025 are to and from West Falls Church and Vienna, whereas Reston transit trips are expected to increase to 14 percent. The share of work transit trips bound for Tysons Corner is not expected to change in 2025.

## 1.3 NEED FOR IMPROVEMENTS

The transportation needs of the Dulles Corridor have been documented previously in numerous studies and plans (see Section 1.6). The analyses conducted for these studies focused on several interrelated elements.

- **Anticipated Population and Employment Growth.** Over the next 25 years, growth in the Dulles Corridor is expected to continue at rates that are nearly double those anticipated for the region as a whole.
- **Future Land Use and Development Plans.** Local land use plans call for higher-intensity office, retail, and residential development at existing activity centers in the corridor, and allow for concentrated development on parcels at the emerging activity centers in Dulles Corner and eastern Loudoun County.
- **Increased Travel Demand.** More residents and more job opportunities, when combined with expected increases in passenger and freight operations at Dulles Airport, will result in higher travel demand on highways and streets in the Dulles Corridor and throughout the region.

- **Limitations of the Existing and Planned Roadway System.** Existing travel demand is straining the roadway system to its capacity, resulting in moderate to severe congestion throughout the Dulles Corridor. Despite planned capacity improvements for various corridor roadways, the future highway system will be unable to meet the anticipated increases in travel demand. However, with a limited amount of remaining right-of-way, the corridor will be unable to support further roadway capacity enhancements.
- **Limitations of the Existing Transit System.** Many existing transit services are a poor alternative to auto travel, because they are also affected by increasing roadway congestion and many services have higher travel times between key origins and destinations than travel by private auto. In the future, transit services that continue to operate on congested roadways will not effectively serve growth in travel.
- **Air Quality.** The inability to serve the anticipated demand will cause substantial deterioration in highway and transit operations in the Dulles Corridor, contributing to increased air quality problems in the Washington metropolitan region.

The combined effect of these elements creates a need for improved transportation alternatives and connections in the Dulles Corridor.

### 1.3.1 ANTICIPATED POPULATION AND EMPLOYMENT GROWTH

MWCOG expects that over the next 25 years, population and employment in the Dulles Corridor will increase more rapidly than the metropolitan regional averages. Analysis of MWCOG's Cooperative Forecast Data on population, employment, and household growth shows that by 2025, the corridor will experience a 71 percent increase in jobs, compared to an average increase of 39 percent throughout the region. Likewise, population in the corridor is expected to increase 56 percent between 2000 and 2025, compared to 32 percent population growth in the region. MWAA projects that Dulles Airport will experience considerable increases in air travel patronage, air cargo operations, and employment. Growth in passenger use alone is projected to reach 55 million trips by 2035—more than twice the current level.

Given these projected levels of growth, improving corridor mobility and creating better intermodal connections will be key factors in meeting the transportation needs of residents and employees in the corridor, as well as the needs of increasing numbers of visitors to the region.

#### 1.3.1.1 Population

Growth statistics for the Washington metropolitan region indicate that current and anticipated growth in suburban population centers far outpaces residential growth in the region's core, especially for centers in Northern Virginia. According to MWCOG and US Census data, in 1960 Washington, D.C. was the region's largest population center with 764,000 residents, and Fairfax County was the region's fourth largest jurisdiction with 275,000 residents. By 2000 the two jurisdictions had switched places: Fairfax was the largest jurisdiction in the region, with almost 970,000 residents, compared to Washington, D.C.'s 572,000 residents. The latest MWCOG forecasts indicate that, over the next 25 years, this growth trend is expected to continue, with Fairfax County population totals reaching 1.2 million residents. This total exceeds not only Washington, D.C.'s projected total (650,000 residents), but also the total for Washington, D.C., Arlington County, and the City of Alexandria combined (1 million residents). Moreover, in this same time frame, the outer suburbs in Northern Virginia are expected to grow at a substantial rate. In Loudoun County alone, the population is expected to increase 200 percent from 170,000 people to 510,000 people.

Growth trends in Fairfax County and Loudoun County are reflected in the anticipated growth for the Dulles Corridor. As shown in Table 1.3-1, the regional population is expected to increase from 4.4 million residents to 5.9 million residents by 2025, an increase of 32 percent. At the same time, the population in the Dulles Corridor is expected to grow at nearly twice that rate (56 percent), from approximately 370,000 residents to 570,000 residents.

**Table 1.3-1: Population within the Region and the Dulles Corridor**

| | 2000 | 2005 | 2010 | 2025 |
|---|---|---|---|---|
| **Region** | | | | |
| Population | 4,449,133 | 4,793,250 | 5,108,117 | 5,894,025 |
| Persons/Acre | 1.60 | 1.72 | 1.84 | 2.12 |
| **Corridor** | | | | |
| Population | 368,537 | 425,957 | 479,627 | 574,108 |
| Persons/Acre | 3.21 | 3.71 | 4.18 | 5.00 |

Source: MWCOG, Round 6.2 Cooperative Forecasts

The bulk of the population growth in Fairfax County will be concentrated around Tysons Corner, Reston, and Herndon, with densities increasing reaching greater than 10 persons per acre. In Loudoun County growth is projected to occur primarily in the eastern portion of the county, along the Dulles Greenway and Route 28. Here, the number of residents is expected to increase to almost 183,000 by 2025. This is an increase of more than 126,000 residents and represents more than 37 percent of all population growth in Loudoun County.

#### 1.3.1.2 Employment

Despite strong employment growth in the Maryland and Northern Virginia suburbs, MWCOG Cooperative Forecasts show that, in 2000, Washington, D.C. had the single largest concentration of employment, with nearly 680,000 jobs. The urban core is expected to remain the largest regional employment center, as it continues to contain the seat of government and the headquarters of most federal agencies. The next largest employment centers were Montgomery County and Fairfax County, with approximately 540,000 jobs and 530,000 jobs, respectively. Overall, the combined employment totals for the inner suburbs (1.4 million jobs in Montgomery, Prince George's, and Fairfax counties, and Rockville, City of Falls Church, and City of Fairfax) were greater than those for the three central jurisdictions (980,000 jobs in Washington, D.C., Arlington County, and City of Alexandria).

In 2025, Washington, D.C. is expected to remain the region's largest employment center, with an increase of approximately 150,000 jobs. The largest absolute job growth is anticipated in Fairfax and Prince George's counties, with increases of approximately 200,000 jobs and 160,000 jobs, respectively. However, the largest percentage growth in employment, by far, is expected in Loudoun County with a 173 percent increase in jobs. Throughout the region, nearly two thirds of all new jobs are anticipated to be in the service industry, which includes professions related to engineering, computer and data processing, business services, and medical research, among others.

Reflecting the substantial employment increases in Fairfax and Loudoun counties, the Dulles Corridor is projected to have a similar increase in employment between 2000 and 2025. Table 1.3-2 shows that, whereas regional employment is forecast to grow by nearly 39 percent between 2000 and 2025—slightly higher than the rate seen for population and household growth—the number of jobs in the Dulles Corridor is projected to increase by roughly 71 percent, adding more than 200,000 jobs to the corridor.

**Table 1.3-2: Employment within the Region and the Dulles Corridor**

| | 2000 | 2005 | 2010 | 2025 |
|---|---|---|---|---|
| **Region** | | | | |
| Employment | 2,796,870 | 3,072,398 | 3,319,025 | 3,891,914 |
| Number of Jobs/Acre | 1.01 | 1.10 | 1.19 | 1.40 |
| **Corridor** | | | | |
| Employment | 287,023 | 343,442 | 394,423 | 490,236 |
| Number of Jobs/Acre | 2.50 | 2.99 | 3.43 | 4.27 |

Source: MWCOG, Round 6.2 Cooperative Forecasts

The Fairfax County portion of the corridor is expected to have the largest absolute increase in number of jobs, but it is anticipated that the Loudoun County portion of the corridor will have the largest percentage increase in employment. According to MWCOG data, in eastern Loudoun County, it is anticipated that 100,000 jobs will be added by 2025, resulting in an average density of more than 10 jobs per acre in the employment zones along the Dulles Greenway and northern Route 28, and accounting for almost 70 percent of all employment growth in Loudoun County. A major contributor to job growth in Loudoun County is Dulles Airport, which is one of the largest employers in the corridor with more than 15,400 employees. As passenger and cargo operations at Dulles Airport increase, employment is projected to increase to 65,000 employees by 2035.

### 1.3.2 FUTURE LAND USE AND DEVELOPMENT PLANS

The economic benefits of new development in the Dulles Corridor are influential not only for Fairfax and Loudoun counties, but for the region as a whole. Improved transportation alternatives and connections are needed to keep pace with the increased travel demand and the patterns of travel created by new development. In response to growing population and employment in the corridor, residential development and commercial real estate activity are occurring at a record pace. More than 23 million square feet of development has recently been constructed or approved for development. As noted in Section 1.2, much of this development is occurring in the vicinity of Dulles Airport at the western end of the corridor. Activity centers such as Dulles Corner and eastern Loudoun County are becoming known as technology and communications centers. Rapidly growing high-tech companies and professional service firms are purchasing and developing large amounts of land in these areas, fueling the region's largest commercial construction boom in a decade.

Most of the planned development in the corridor over the next 25 years is slated to occur in the existing and emerging activity centers. Development in Tysons Corner is expected to intensify, including higher-density infill development and redevelopment. Office development will be supported by retail and services, and in some cases will be intermixed with higher-intensity residential development. Undeveloped land in the Reston-Herndon area is planned for additional office, retail, and residential use. In the vicinity of key interchanges along the Dulles Toll Road, existing commercial development could be intensified. The current development activities in Dulles Corner and eastern Loudoun County will continue, including large-scale regional office development, hotels, industrial parks, higher-density residential development, and mixed-use development with office, residential, and retail space.

New development is also planned at Dulles Airport to accommodate the anticipated increases in passenger and cargo service. This development includes a new concourse, a new runway, and additional parking, all of which will increase travel demand in the corridor.

### 1.3.3 INCREASED TRAVEL DEMAND

Continued growth in the Dulles Corridor will result in noticeably higher travel volumes throughout the corridor and the region. Between 2000 and 2025, it is estimated that regional travel will increase by 31 percent, growing from 17.9 million person trips per day to 23.5 million person trips per day. Similarly, work trips in the region are expected to increase 36 percent, from 3.6 million trips per day to 4.9 million. The highest concentrations of travel growth for the region will occur in the Dulles Corridor and the outer Virginia suburbs, especially for trips to and from eastern Loudoun County. Between 2000 and 2025, the total number of corridor-related trips is expected to increase 56 percent (from 2.2 million trips to 3.4 million), while the total number of trips to and from eastern Loudoun County is projected to increase nearly 190 percent (from 400,000 trips to 1.2 million). Work trips to and from eastern Loudoun County are also expected to increase 190 percent (from 70,000 trips to 200,000). In addition, substantial growth is projected for work trips to Herndon and the northern Route 28 corridor (a 58 percent increase from 63,000 to 100,000 trips).

As discussed in Section 1.2.4, it is anticipated that eastern Loudoun County will attract a larger share of overall corridor-related travel, including an increasing number of trips made by residents from other parts of the corridor (from 50,000 daily trips in 2000 to 120,000 trips in 2025). However, other corridor activity centers will continue to attract and produce large numbers of trips. For example, employment and shopping opportunities in Tysons Corner and Reston will continue to attract numerous residents from the Dulles Corridor, other parts of Fairfax County, and the outer Virginia suburbs (more than 500,000 daily trips). Jobs in the region's core will also continue to attract large numbers of corridor residents (nearly 80,000 residents).

The minor changes in corridor travel patterns, combined with increasing numbers of trips, will result in noticeably higher traffic volumes throughout the Dulles Corridor. Based on VDOT estimates and project team projections, it is expected that between 2000 and 2025, eastbound traffic volumes on the Dulles Toll Road will increase from 6,200 vehicles to 8,200 vehicles in the peak hour between Hunter Mill Road and Reston Parkway (excluding the high-occupancy vehicle lanes). Similarly, peak volumes at specific locations along other major arterials within the corridor are expected to increase substantially. For example, westbound volumes on the Dulles Connector Road are expected to increase from 3,600 to 6,200 vehicles, while eastbound traffic on the Dulles Greenway is expected to grow from 3,300 to 8,100 vehicles and westbound traffic on Route 50 is projected to increase from 5,700 to 8,300 vehicles. Increasing volumes on these regional routes will force more vehicles on to local roads, causing increases in delay at many key intersections throughout the corridor. For example, in Tysons Corner project team estimates indicate substantial increases in delay are likely along Route 7, International Drive, and Westpark Drive. For some of these locations, delay is expected to increase by nearly 300 seconds, indicating considerable growth in the number of vehicles on the roadways (see Chapter 6 for more detailed information on traffic volumes and intersection delay).

### 1.3.4 LIMITATIONS OF THE EXISTING ROADWAY SYSTEM

For much of the Dulles Corridor transportation network, current traffic volumes meet or exceed the capacity of roadways and intersections, causing severe congestion in the corridor. Typically, the level of congestion on a roadway or at an intersection is reflected by a qualitative measure called level of service (LOS). In general, LOS represents the average delay experienced by vehicles traveling along a road or through an intersection. Six letter designations (A through F) are used to represent different levels of service, with LOS A reflecting free flow conditions and LOS E and F representing very congested or gridlock conditions. Many of the facilities in the Dulles Corridor are currently at LOS E and F, and increasing demand is only expected to worsen conditions.

As part of efforts to ease congestion in the corridor, several roadway expansion projects are planned over the next 20 years. Additional lanes are planned for many corridor routes—including the DAAR, the Dulles Greenway, I-495, Route 7, Route 123, Route 7100, Route 28, Route 50, and the Loudoun County Parkway. With the exception of Route 50, which will only be expanded in the western end of the corridor, most of these routes will be expanded for much of their length through the corridor. Additional capacity enhancements include interchange improvements planned for the Dulles Toll Road, I-495, and Route 7, and plans to convert the existing at-grade intersections along Route 28 into interchanges. All of these improvements are scheduled to be in place by 2025, and many will be implemented sooner.

Though some localized improvements are expected in Tysons Corner, Reston, and Herndon in the vicinity of interchange improvements, road widening, or intersection improvements, in general, the improvements outlined above are not expected to improve travel conditions in the corridor; rather, they are expected only to provide enough capacity to maintain existing, near-gridlock conditions. Project team forecasts for 2025, which take the planned improvements into account, show that I-66, I-495, the Dulles Connector Road, the Dulles Toll Road, and Route 50 are projected to continue to operate at LOS E or F in the peak hour. At the same time, traffic conditions on the DAAR and the Dulles Greenway are expected to deteriorate (from LOS C to D and LOS D to F, respectively). Likewise, as detailed in Chapter 6, numerous intersections throughout Tysons Corner, Reston, and Herndon are expected to remain at, or worsen to, LOS E and F.

Though the transportation system requires additional capacity to serve the ever-increasing travel demands in the Dulles Corridor, expansions to the roadway network are constrained by limitations of right-of-way and development patterns. The existing and planned development in the corridor restricts the amount of land available for roadway expansion projects. The expansion of the Toll Road to an eight-lane facility in 1998 used its remaining right-of-way; as a result, adding new traffic lanes to the main east-west route through the Dulles Corridor is no longer viable. Other planned roadway improvements in the corridor will use the majority of the remaining right-of-way. Further roadway expansions would likely have impacts on a substantial number of businesses and residents.

### 1.3.5 LIMITATIONS OF THE EXISTING TRANSIT SYSTEM

Because the existing transit system in the Dulles Corridor operates on the congested roadways described above, it generally offers a poor alternative to auto travel. Congestion reduces the reliability of transit services and increases transit travel times because, in addition to traveling in slow-moving traffic, transit vehicles have to stop to pick up and drop off passengers. For travel between several key origins and destinations in the corridor and the region, current transit travel times are approximately 20 to 30 minutes more than those for travel by private auto. As a result, transit in the corridor is not a sufficiently attractive travel alternative—as reflected by the 9 percent transit share of all daily work trips (approximately 40,000 trips)—and does little to effectively serve the existing high levels of travel demand.

Over the next 25 years, the share of daily transit travel is expected to remain relatively low. Though the absolute number of corridor-related daily transit trips is projected to increase by more than 30,000 trips per day, the transit share of daily work trips is expected to remain at 9 percent between 2000 and 2025. This share is much lower than the 16 percent transit share experienced region-wide for daily work travel.

Though transit improvements are needed in the corridor, the effectiveness of planned expansions to the corridor transit system—including enhancements to Fairfax County bus service and new express bus service for Loudoun County—will be hampered by increasing roadway congestion. With the exception of several express routes

that use the DAAR, nearly all transit routes in the corridor travel on the same general-use traffic lanes and arterial routes that private vehicles use. As a result, many of the enhanced transit services in the corridor will continue to experience increased travel times and reduced schedule reliability, decreasing their attractiveness as an alternative to auto travel in the corridor and limiting their ability to adequately serve the anticipated growth in travel demand. (For some routes, however, increases in express and local service are expected to reduce wait times, improving overall travel times for these routes by 5 to 10 minutes.)

Consequently, in order for transit to be effective in the corridor, it would need to operate in a separated or restricted right-of-way. Through operation in a dedicated right-of-way, transit service would be able to bypass much of the congestion in the corridor, offering travel time savings and providing a viable alternative to auto travel on congested roadways.

The DAAR is an underutilized transportation resource in the corridor, with the potential for developing additional capacity in a separate or restricted right-of-way. The roadway extends through most of the corridor, is close to all the key activity centers in the corridor, and has limited access with reasonably free-flowing traffic, which would allow for an express bus service. In addition, the median of the DAAR has been reserved for the last 35 years for a future transit line and is capable of supporting a rail line or a bus rapid transit alternative.

### 1.3.6 AIR QUALITY

Current traffic congestion in the Dulles Corridor contributes to air quality problems in the Washington metropolitan region. The region has been designated a non-attainment area for ozone, one of the six criteria pollutants monitored by the U.S. Environmental Protection Agency (EPA). A non-attainment designation indicates that the measured air quality exceeds the National Ambient Air Quality Standards (NAAQS) for this pollutant.

To ensure compliance with the NAAQS, each state must develop a state implementation plan (SIP) demonstrating that every effort is being made to achieve or maintain attainment status. New programs or projects must be in compliance with this SIP. Because emissions from autos are major components in the formation of ozone, the SIP for Virginia includes transportation control measures to reduce vehicle miles traveled. Reducing vehicle miles traveled should lead to a decrease in emissions and, over time, contribute to the attainment of air quality standards in the region.

Accordingly, there is a need to develop improvements in the corridor that will reduce vehicle miles traveled and emissions. The transportation improvements currently planned for the corridor will be unable to effectively serve the anticipated increases in demand and, as a result, congestion and emissions will likely increase. To help attain regional air quality goals, additional transportation improvements in the corridor must be able to move high volumes of travelers while generating low pollutant emissions and reducing vehicle miles traveled.

## 1.4 GOALS AND OBJECTIVES

All alternatives under consideration in this Draft EIS were developed and evaluated to meet transportation needs using a specific set of goals and objectives. The goals were designed to address the transportation needs of the corridor, as well as the transportation goals of the region. Accordingly, alternatives were assessed to determine how well they:

- Improve transportation service;

- Increase transit ridership;
- Support future development;
- Support environmental quality;
- Provide cost-effective, achievable transportation solutions; and
- Serve diverse populations.

These goals for the Dulles Corridor Rapid Transit Project were originally developed as part of the 1997 MIS. The goals and objectives were reviewed, discussed, and adjusted in response to stated public concerns over the course of project development throughout the MIS process and as part of the preliminary environmental review process for the Draft EIS. The goals and current objectives for the Dulles Corridor Rapid Transit Project are outlined in Table 1.4-1 on the following page. Because several of the goals are interrelated, some of the objectives apply to more than one goal.

**Table 1.4-1: Goals and Objectives**

| Goals | Objectives |
|---|---|
| **Goal 1**<br>Improve Transportation Service | ▪ Provide more frequent service for trips to the core of the region, Tysons Corner, Reston/Herndon, Dulles Airport, and eastern Loudoun County.<br>▪ Provide multi-modal access.<br>▪ Improve travel times within the corridor and the region.<br>▪ Provide integrated, seamless transit service to Tysons Corner and other major activity centers.<br>▪ Provide improved transit service in the corridor in the near term. |
| **Goal 2**<br>Increase Transit Ridership | ▪ Provide more frequent service for trips to the core of the region, Tysons Corner, Reston/Herndon, Dulles Airport, and eastern Loudoun County.<br>▪ Provide multi-modal access.<br>▪ Improve the amenities of the existing transit service within the corridor and the region.<br>▪ Improve travel times within the corridor and the region.<br>▪ Provide integrated, seamless transit service to Tysons Corner and other major activity centers.<br>▪ Provide improved transit service in the corridor in the near term. |
| **Goal 3**<br>Support Future Development | ▪ Provide improved accessibility to existing and planned activity centers in the corridor and the region.<br>▪ Provide transit service that supports and is consistent with the character of the existing and future land use and development.<br>▪ Provide stations that are compatible with the character of the surrounding neighborhoods and encourage transit use. |
| **Goal 4**<br>Support Environmental Quality | ▪ Contribute to the attainment of regional air quality standards.<br>▪ Minimize negative impacts to traffic patterns.<br>▪ Minimize negative impacts on neighborhoods and residential land uses.<br>▪ Minimize negative impacts to ecologically sensitive areas.<br>▪ Minimize negative impacts to historic and cultural resources.<br>▪ Minimize negative visual and aesthetic impacts. |
| **Goal 5**<br>Provide Cost-effective, Achievable Transportation Solutions | ▪ Develop transportation improvements that are consistent with the funding and financial capacity of the region.<br>▪ Minimize project-operating costs.<br>▪ Optimize cost-effectiveness. |
| **Goal 6**<br>Serve Diverse Populations | ▪ Balance benefits and impacts to all residents within the corridor.<br>▪ Improve accessibility to existing and planned employment centers from low-income and minority areas.<br>▪ Provide transportation improvements that comply with the Americans with Disabilities Act standards.<br>▪ Minimize and mitigate negative impacts to low-income and minority populations. |

Based on the goals and objectives, a set of specific evaluation criteria were developed to determine the relative advantages and disadvantages of each alternative proposed for the Dulles Corridor Rapid Transit Project. The four basic categories of evaluation criteria are social, environmental, economic, and transportation. These criteria are designed to help decision makers to identify similarities, differences, and trade-offs between each alternative.

## 1.5 PROPOSED ACTION

In response to the needs identified in Section 1.3, and based on work completed in prior studies, DRPT and WMATA have proposed the Dulles Corridor Rapid Transit Project. The proposed project consists of transit system enhancements operating in the 24-mile Dulles Corridor, providing a direct connection to the existing Metrorail system. These enhancements would offer an alternative means of travel for the growing number of residents, employees, and visitors in the Dulles Corridor, and, as a high-quality link to the Metrorail system, would improve mobility throughout the region. By providing a high-capacity transportation choice for travelers, the proposed project would be better able to meet the anticipated increases in travel demand, and help reduce future congestion in the corridor. Moreover, the ability of the proposed improvements to increase person-moving capacity over long distances with fewer numbers of vehicles should help minimize future increases in vehicle miles traveled in the corridor and vehicle emissions.

The Dulles Corridor Rapid Transit Project is envisioned as a new rapid transit line that provides service to key activity centers along the corridor, including Dulles Airport, and functions as an extension of the regional Metrorail system. Multiple technology options are under consideration, but regardless of which technology is ultimately selected, the new transit line will be completely integrated with the existing Metrorail system, particularly in terms of scheduling, signage, and fare collection.

The proposed Build Alternatives under consideration for the Dulles Corridor Rapid Transit Project are:

- Bus Rapid Transit (BRT);
- Metrorail;
- BRT/Metrorail; and
- Phased Implementation.

Several alignment variations are being examined for each alternative. The BRT/Metrorail Alternative is a combination of the two modes, where Metrorail would be constructed between the existing Orange Line and Tysons Corner, and BRT would be constructed in the remainder of the corridor.

BRT is a bus-based transit system that operates like a rail system. Passengers on BRT are provided rail-like amenities such as off-board fare collection, level boarding, enhanced stations, and platforms. Because it often takes advantage of roadway facilities, BRT is generally a lower-cost transit technology than rail.

Metrorail is a high-speed passenger rail system that is powered by an electrified third rail and operates in exclusive rights-of-way. By using multiple-car trains, Metrorail is capable of moving high volumes of passengers. Key features of the Metrorail system are fixed stations, dedicated right-of-way, advanced fare collection, relatively simple transfers between different lines, and multiple-door boarding from level platforms.

The Phased Implementation Alternative would combine the other three Build Alternatives into a program of rapid transit improvements that would be implemented in stages. This approach would allow decision-makers to begin to address the travel needs in the corridor with rapid transit in the near term, while allowing for future development of rail. Following the recommended approach presented in the 1999 MIS Supplement, the BRT Alternative would be constructed first; then Metrorail would be constructed from the Orange Line through Tysons Corner, connecting to BRT service between Tysons Corner and Loudoun County; and finally, Metrorail would be constructed between Tysons Corner and Loudoun County, replacing BRT service in the corridor. Each phase would include and build on the improvements constructed during previous phases. For example, during the initial phase, the BRT median stations would be designed so that they could be converted to rail stations during the final phase.

All alternatives proposed for the Dulles Corridor Rapid Transit Project follow an alignment that generally runs along the Dulles Connector Road, the DAAR, and the Dulles Greenway. For the BRT Alternative, buses would travel primarily in mixed traffic, either on the DAAR or the Dulles Toll Road. The DAAR is restricted to passengers, customers, and personnel of Dulles Airport, so traffic is relatively free-flowing on this road. Buses operating on the Toll Road would generally use the high-occupancy vehicle (HOV) lanes. During periods of severe congestion, buses traveling eastbound on the Dulles Connector Road are permitted to use the shoulder, when such use does not present a safety hazard to general purpose traffic. The Metrorail Alternative would operate at ground level in the median of the Connector Road, the DAAR, and the Dulles Greenway, diverging at Tysons Corner and Dulles Airport to provide direct service to these key activity centers. The BRT/Metrorail Alternative would follow the rail alignment from the Metrorail Orange Line through Tysons Corner, and then follow the BRT alignment through the central and western portions of the corridor. The alignments for the Phased Implementation Alternative are the same as those for the BRT, Metrorail, and BRT/Metrorail alternatives.

In the central portion of the Dulles Corridor, all four alternatives include stations located in the median of the DAAR. These median stations would have a similar design to those on the existing Metrorail system, and passengers would access the stations via pedestrian bridges that connect to station facilities located on the north and/or south sides of the Dulles Toll Road. For the BRT, BRT/Metrorail, and Phased Implementation alternatives, the BRT median stations would be designed for future conversion to rail stations. Some variations of the BRT Alternative would use stops rather than stations in the central portion of the corridor. Stops would be located outside the median, and BRT vehicles would provide direct access to them by exiting the main highway. Stops would not include pedestrian bridges.

The eastern and western portions of the corridor would be served either by stations or stops. The Metrorail Alternative includes aerial and possibly underground stations in Tysons Corner, an underground station at Dulles Airport, and additional median stations along the Dulles Greenway. The BRT Alternative, on the other hand, includes BRT stops at Dulles Airport and outside the Dulles Greenway, and would include a station or stop in Tysons Corner. The BRT/Metrorail Alternative includes rail stations in Tysons Corner, BRT stations in the median of the DAAR, and BRT stops at Dulles Airport and outside the Greenway.

Because the Dulles Corridor Rapid Transit Project is envisioned as an extension of the existing Metrorail system, each proposed alternative would include a direct connection to the Metrorail Orange Line. The BRT Alternative would provide direct service to the West Falls Church Station on the Orange Line. Access facilities on the north side of the station would be modified to include a transfer area that would allow BRT passengers to easily transfer between BRT and Metrorail, in a manner similar to a transfer between different Metrorail lines. For the Metrorail Alternative, the tracks would tie directly into the Orange Line, allowing eastbound

trains on the Dulles Corridor line to continue on to East Falls Church Station and the region's core. Passengers traveling to points east on the Orange Line would not have to transfer; passengers wishing to travel to points west on the Orange Line would change trains at East Falls Church Station. For the BRT/Metrorail Alternative, passengers would transfer between BRT and Metrorail at a station in Tysons Corner. Passengers connecting to Metrorail would then continue to East Falls Church Station and points east on the Orange Line, as described above. The Phased Implementation Alternative would include each of the transfer facilities and types discussed above as implementation and conversion progresses.

Other elements of the proposed project include a maintenance and storage facility and other ancillary facilities. The BRT Alternative would include a BRT maintenance and storage facility near the western end of the corridor, and the Metrorail Alternative would include a new rail service and inspection (S&I) yard in the same general area. The Metrorail Alternative would also include storage tracks at the existing West Falls Church S&I Yard, traction power substations, tie-breaker stations and stormwater management facilities. Traction power substations and tie-breaker stations (ancillary facilities associated with the supply of power to the rail line) would be located at various points along the alignment. The BRT/Metrorail Alternative would include the BRT facility, the additional storage tracks, and some traction power substations and tie-breaker stations. For the Phased Implementation Alternative, both a new BRT maintenance and storage facility and a rail S&I yard would be constructed, in addition to additional storage tracks at West Falls Church S&I Yard, traction power substations, and tie-breaker stations. A site capable of supporting both BRT and rail facilities is under consideration for this alternative.

A more detailed description of the four Build Alternatives under consideration for the proposed project and a description of the Baseline Alternative are presented in Chapter 2.

For all Build Alternatives, the Commonwealth of Virginia has proposed the following partnering arrangement to implement the project: DRPT would be the project sponsor and federal grant recipient for the project; and WMATA would be DRPT's authorized representative and technical manager for the preliminary engineering and for the design/build contract. DRPT would have the design/build contracting responsibility and would be the owner of the project. WMATA would be the leaseholder and the operator for the project.

## 1.6 PLANNING CONTEXT

The planning context for the Dulles Corridor Rapid Transit Project includes previous studies and plans, related studies, and the overall process for project development. In the following sections, previous studies related to transit in the Dulles Corridor are described, plans that include the project as a future improvement are identified, and related studies that will affect or be affected by the project are discussed. In addition, the purpose of the Draft EIS is explained in more detail, the way the document fits into the continuing environmental review and project development process is described, and decision-making bodies and required approvals are identified.

### 1.6.1 PREVIOUS STUDIES AND PLANS

Over the last four decades, the transportation needs of the Dulles Corridor and potential improvements for the corridor have been the subject of several studies conducted by public agencies and private businesses. Most of the studies have identified mass transit alternatives as part of the transportation solution for the corridor, and as a result numerous comprehensive and regional plans have included references to specific transit alternatives, supportive land use measures, and potential funding sources for the Dulles Corridor. Proposed transit solutions

for the Dulles Corridor have also been recognized at the federal level, including the identification of the Dulles Corridor Rapid Transit Project as one of the candidate projects to receive federal funding in the TEA-21, a federal law that authorizes the government to fund transportation projects.

In the following sections, the major studies and plans related to the Dulles Corridor are identified and the alternatives or measures proposed in them are briefly described.

#### 1.6.1.1 Corridor Studies and Plans

The studies and plans identified in this section are specifically focused on the needs of the Dulles Corridor. Many of them recommended potential transportation solutions for the corridor as whole, whereas others addressed a particular part of the corridor. The studies and plans are presented in chronological order.

##### Consideration as part of the Washington Regional Metrorail System (1969)

Serving Dulles Airport with rail transit was considered during WMATA's initial planning and construction of the Metrorail system. The study showed the Metrorail system's ability to meet several needs identified for the region, including the desire to:

- Promote satisfactory movement of people and goods;
- Provide efficient, cost-effective mass transportation;
- Alleviate present and future traffic congestion;
- Promote economic welfare and vitality;
- Support the orderly growth and development of the region; and
- Provide comfortable and convenient travel for residents and visitors.

Despite these identified needs, a Metrorail extension to Dulles Airport was not included in the original Adopted Regional System because the area was only beginning to emerge as an activity center. The level of development in the corridor did not warrant an extension at that time.

##### Northern Virginia Light Rail, Inc. (1983)

In response to a perceived need for transit improvements in the Dulles Corridor, a private consortium known as Northern Virginia Light Rail, Inc. (NOVA Rail) proposed to collect contributions from local developers to build a light rail line to Dulles Airport. Operation of the line would be turned over to WMATA following construction.

##### Airport Master Plan (1985)

In 1985, during the update process for the Dulles Airport Master Plan, FAA recommended that the median of the DAAR continue to be reserved for a future transit line to the airport. It was anticipated that the future transit line would likely be an expansion of the Metrorail system.

##### Dulles Corridor Transit Development Feasibility Study (1985)

The Urban Mass Transit Administration (renamed the Federal Transit Administration in 1991) sponsored the *Dulles Corridor Transit Development Feasibility Study* to examine private-sector strategies for funding transit improvements in the corridor. The study team examined a number of private and public funding mechanisms, including:

- Farebox revenues;

- Benefit assessments levied against airport passengers and Toll Road users;
- Leases and development of federally owned land around the airport; and
- Special benefit assessment districts around potential stations.

The study concluded that a combination of these mechanisms could be used to develop funding for a Dulles Corridor rail line, and therefore, a line was financially feasible.

### DartRAIL (1985 – 1992)

From 1985 until 1992, a private group named Dulles Access Rapid Transit (DartRAIL) sponsored a proposal to build a rail transit line between the West Falls Church Metrorail Station and Dulles Airport. The initiative focused on finding a specific mechanism for funding transit in the Dulles Corridor. DartRAIL recommended raising capital funds through assessments and donations from interested parties, property owners and developers, and the operators of Dulles Airport, in addition to using surplus Dulles Toll Road revenues.

### Dulles Airport Access Road Corridor Transit Alternatives Analysis Study (1990)

In 1990, Fairfax County identified a continued need for transit in the Dulles Corridor. To evaluate various options for the corridor, the County sponsored an alternatives analysis study that focused on the DAAR. The study team assessed alternatives that included expanded express bus service on the DAAR, construction of an exclusive HOV facility in the median of the DAAR, use of light rail or automated guideway transit facilities, and the extension of Metrorail. Study recommendations included pursuing an enhanced express bus system to serve residential neighborhoods and a number of new park-and-ride lots throughout the corridor. The initial elements of the recommended system have since been implemented.

The alternatives analysis study also included preliminary projections of transit demand in the Dulles Corridor. Findings indicated that demand in the corridor would be comparable to demand in several other rail corridors in the metropolitan area. Moreover, ridership in the corridor would likely exceed ridership for rail projects recently implemented in other cities.

### Dulles Corridor Plan (1992)

Recognizing the need for improved transit access in the Dulles Corridor, the Commonwealth Transportation Board (CTB) passed a resolution that led to the adoption of the *Dulles Corridor Plan*. The plan endorsed implementation of rail in the Dulles Corridor by 2005. Among the actions identified were:

- Implementation of a high level of bus service to develop transit ridership patterns for future rail service, as well as introduction of new intra-county feeder bus services;
- Construction of park-and-ride lots, with Dulles Toll Road interchanges and ramps to provide direct access to park-and-ride lots for HOVs, and other efforts to preserve future rail station sites;
- Further analysis of the long-term need to make major improvements to interchanges in the corridor;
- Preparation of a detailed financial plan to determine funding needs and funding sources for a rail project; and
- The use of federally authorized funds to begin development of a rail project, including alternatives analysis and environmental studies.

### Reston East Park-and-Ride Studies (1995, 2000)

The *Reston East at Wiehle Avenue Park-and-Ride Facility Environmental Study*, completed in 1995, was one in a series of environmental assessments sponsored by Fairfax County to identify impacts associated with the County's commuter parking expansion program. The Reston East Park-and-Ride facility was designed to reduce traffic congestion in the Dulles Corridor by increasing the number of park-and-ride spaces along the DAAR and Dulles Toll Road. In addition, it was expected that the park-and-ride facility would support future transit improvements in the corridor (new bus services and possibly a rail line). After completion of the environmental study, the Reston East Park-and-Ride facility was constructed.

Subsequently, in the 1999 *Supplement to the Dulles Corridor Transportation Study* (see below), capacity enhancements at the Reston East Park-and-Ride facility were identified as the highest priority improvement for the Reston-Herndon section of a future Dulles Corridor transit project. As a result, the *Reston East Park-and-Ride Parking Demand Study* (2000) was conducted to assess the existing and future parking demands for the park-and-ride. It was recommended that a multilevel parking structure be constructed over the course of the phased implementation of the Dulles Corridor project.

### Dulles Corridor Transportation Study and Supplement (1997, 1999)

DRPT initiated the *Dulles Corridor Transportation Study*, a Major Investment Study (MIS), as a response to the adopted *Dulles Corridor Plan*. The study and its 1999 Supplement were conducted with the oversight of a policy advisory committee and a technical committee, the guidance of three county-sponsored task forces and committees, and ideas and comments received through extensive public participation.

For the MIS and its Supplement, the study teams examined the growth projections for the Dulles Corridor and the region, analyzed changes in travel patterns resulting from development in the corridor, considered a variety of transportation improvements to reflect the identified travel needs, and discussed the costs, benefits, and impacts of these alternatives. It was also determined that the transit improvements should begin at the Orange Line and terminate in eastern Loudoun County, due to the substantive amount of growth projected there.

It was recommended in the MIS that a rail extension of the Metrorail system be implemented in the median of the DAAR and the Dulles Greenway. The study team for the MIS Supplement subsequently recommended that this rail line be implemented through a multi-modal transportation investment program. The program would begin with express bus service, and then enhanced express bus services would be implemented. Subsequent phases included developing a BRT system along the DAAR, and finally converting this BRT system to a rail line in two stages. The BRT and rail alternatives and the proposed phasing approach developed during these studies were carried forward as the Dulles Corridor Rapid Transit Project and are being further developed during the preliminary engineering and environmental review phase of the project planning process. These alternatives were briefly described in Section 1.4 and are presented in more detail in Chapter 2.

### Herndon-Monroe Station Northside Access Study (2000)

Given the transit and phasing alternatives recommended in the MIS and its Supplement, the *Herndon-Monroe Station Northside Access Study* was conducted to examine concepts for providing multi-modal access to the north side of the Toll Road from the proposed transit station at the existing Herndon-Monroe Park-and-Ride facility. The improvements recommended by the Town of Herndon through resolution of the Town Council, which were subsequently adopted, include a series of sidewalks to provide pedestrian connections, a small Kiss & Ride area, and a bus drop-off area to be located in an existing, private surface parking lot. Other improvements recommended in the study included a parking deck to replace the spaces lost for the drop-off facility, a traffic

signal on Herndon Parkway, and potential parking controls to ensure that commuters do not park in the private surface lots around the pedestrian bridge connecting to the median station.

#### 1.6.1.2 County Transportation and Comprehensive Plans

The planned improvements for the Dulles Corridor Rapid Transit Project, or supportive measures for the project, are included in the following plans, which identify needs and planned improvements for the counties as a whole:

- *Fairfax County Transportation Plan* (1995)
- *Fairfax County Comprehensive Plan* (2000)
- *Loudoun County Countywide Transportation Plan* (1995)
- *Loudoun County Revised General Plan* (2001)

Because they were completed prior to the 1997 MIS and its 1999 Supplement, the two transportation plans include less specific actions relative to the Dulles Corridor. In the *Fairfax County Transportation Plan*, the corridor is referenced in the plan's transportation enhancement map, on which the corridor is highlighted. The *Loudoun County Countywide Transportation Plan* generally recognizes a need to plan for supportive land uses in the vicinity of future transit centers in specific corridors, including centers at the western end of the Dulles Corridor.

The county comprehensive plans, on the other hand, include much more specific measures in support of planned improvements in the Dulles Corridor. The Fairfax County plan calls for dense development in the corridor, ranging from 8 to 45 dwelling units per acre with a Floor Area Ratio (FAR) in excess of 1.0. Higher-density, mixed-use development will be allowed in the core of Tysons Corner in conjunction with proposed rail stations. The Loudoun County plan allows for up to 50 dwelling units per acre to support proposed transit stations along the Dulles Greenway. The *Loudoun County Revised General Plan* also includes public support for transit services that would use the corridor, such as carpools, vanpools, bus and rail services, and other alternative modes, with specific funding support for bus services.

During work on the Draft EIS, the Dulles Corridor Land Use Task Force was appointed by the Fairfax County Board of Supervisors to review the *Fairfax County Comprehensive Plan* as part of the County's commitment to transit supportive policies in the corridor. The Task Force reviewed the plan's existing land use recommendations for the corridor and recommended changes to better support transit in the Dulles Corridor, such as density increases and mixed-use provisions triggered by the implementation of BRT or Metrorail, and a set of design guidelines that encourages transit-oriented development. Fairfax County reviewed these changes, and a modified set of changes was forwarded to the County Board of Supervisors for approval. The resulting amendments to the Fairfax County Comprehensive Plan were formally adopted in June 2001, and are described in Chapter 3.

#### 1.6.1.3 Regional Plans

The Dulles Corridor Rapid Transit Project, or supportive measures for the project, is also specifically identified in several regional plans. These regional plans, identified below, focus on issues and needs for the Washington metropolitan region as a whole, or for portions of the region.

- *Update to the Financially Constrained Long-Range Transportation Plan for the National Capital Region* (2000)
- *Transportation Improvement Program (TIP) for the Washington Metropolitan Region FY2001- 2006* (2000)

- *State Implementation Plan (SIP) Revision, Phase II Attainment Plan for the Washington, D.C.-MD-VA Nonattainment Area* (2000)
- *Northern Virginia 2020 Transportation Plan* (1999)

The National Capital Region Transportation Planning Board develops the constrained long-range plan (CLRP) and the TIP for the region. They include projects that are designed to ensure environmental quality and maintain the regional transportation system. All planned projects or studies included in the CLRP are those for which funds are "reasonably expected to be available." Highway, transit, and pedestrian/bicycle projects, as well as regional transportation studies, are included. The TIP translates the CLRP into a program of action for the current six-year period. The Dulles Corridor Rapid Transit Project is identified in both plans as the phased implementation of rail service in the corridor. As recommended in the MIS Supplement, the project initially includes express bus service, and then transitions to fixed-guideway bus service and ultimately rail service. The early phases of the project (express bus and fixed-guideway bus) are included in the TIP. All phases are included in the CLRP.

As discussed in Section 1.3.6, an SIP outlines measures and identifies projects intended to help the region achieve or maintain attainment status for six criteria pollutants. The *Phase II Attainment Plan for the Washington, DC–MD–VA Nonattainment Area* was developed by the Metropolitan Washington Air Quality Committee (MWAQC), a multi-jurisdictional committee established by the governors of Maryland and Virginia and the mayor of Washington, D.C. to focus on air quality issues in the Washington metropolitan region. The plan, which was incorporated into the SIPs for Maryland, Virginia, and Washington, D.C., identifies transportation emissions reduction measures (TERMs) intended to bring the region into attainment for ozone. These measures should help reduce emissions by 2020. The Dulles Corridor Rapid Transit Project, as defined in the TIP, is considered part of the range of TERMs.

The *Northern Virginia 2020 Transportation Plan* was developed by the Transportation Coordinating Council of Northern Virginia to meet the transportation needs of the western portion of the Washington metropolitan region. Because the proposed project is consistent with the Northern Virginia goals of reducing commute times, improving regional trip times, and increasing transportation options, the phased implementation of Metrorail in the Dulles Corridor (as recommended in the MIS Supplement) is included in the 2020 Plan.

### 1.6.2 RELATED STUDIES

The Dulles Corridor Rapid Transit Project is related to several recently completed or ongoing studies. Decisions to be made for this project may be affected by the outcomes and decisions associated with these related studies, and vice versa.

#### 1.6.2.1 Metrorail Core Capacity Study, WMATA (2002)

According to MWCOG's regional Round 6.2 Cooperative Land Use Forecasts, the Washington metropolitan region is anticipated to experience a 32 percent increase in population and a 39 percent increase in employment between 2000 and 2025. This growth is expected to result in an increase in regional Metrorail ridership over the same period.

To determine the capacity limits of the existing Metrorail system and to relate projected ridership growth to system capacity, WMATA recently conducted the Metrorail Core Capacity Study. The study used the same population and employment data used for this Draft EIS, as well as the same forecast horizon (2025). Study

recommendations focused on improvements that would maximize the peak period capacity and reliability of the existing system, such as implementation of eight-car train operations, reconfiguration of Blue and Orange line service patterns, and associated improvements. These associated improvements include increases of rail yard and shop capacity, upgrades of traction power sub-stations, station enhancements, station connections, increases in park-and-ride spaces, and improvements to system access through the addition of parking, feeder bus service (which would require additional buses and bus garages), and pedestrian and bicycle improvements. Full implementation of all recommended improvements is estimated to cost $5.7 billion in escalated dollars.

WMATA is currently developing an improvement program that incorporates the Core Capacity Study and Regional Bus Study recommendations and reflects the funding capacities of the WMATA Compact member jurisdictions. This improvement program will be part of the WMATA contribution to the 2003 update of the region's CLRP. The WMATA Board took its first action to implement the recommended improvements on May 23, 2002, when it approved a contract to procure additional rail cars.

The baseline condition assumed for the Dulles Corridor Rapid Transit Project includes several improvements to the existing Metrorail system that would be required to meet growth in passenger demand by 2025. These improvements are identified in the Core Capacity Study.

#### 1.6.2.2 Capital Beltway Corridor Rail Feasibility Study, DRPT (2001)

DRPT initiated the *Capital Beltway Corridor Rail Feasibility Study* to assess the feasibility of a fixed-guideway service in the Beltway Corridor between Springfield and Tysons Corner. Potentially, this service would connect to the alignments identified in the Maryland Capital Beltway Major Investment Study (an ongoing study in which capacity improvements in the Capital Beltway Corridor are being evaluated, including the addition of HOV lanes and/or the addition of a new Metrorail alignment). Several options for fixed-guideway service in the Beltway Corridor were deemed feasible, and several modes and alignments were recommended for further analysis.

Any Beltway Corridor improvements extending into Tysons Corner would need to be coordinated with the planned Dulles Corridor Rapid Transit Project improvements in this area. Depending on the final alignment and timing of proposed improvements, it is anticipated that any further study of Beltway rail will take into account the findings of the Dulles Corridor Rapid Transit Project.

#### 1.6.2.3 Capital Beltway Study, VDOT (ongoing)

Beginning in July 1998, a study team was formed to identify, design, and assess the best combination of improvements for the Capital Beltway in Virginia. The types of improvements being considered include widening the current roadway, reconstructing existing interchanges, providing new connections for HOV traffic, and enhancing express bus service on the Beltway. The study area for the proposed improvements extends for about 14 miles, from Backlick Road in Springfield (the western limits of the Springfield interchange) to the American Legion Bridge, crossing through the eastern end of the Dulles Corridor.

The proposed improvements are identified in the Capital Beltway Study Draft EIS (published in March 2002). This project and the Dulles Corridor Rapid Transit Project will overlap in the vicinity of the Beltway/Route 123 interchange. As work progresses, both project's staff will continue to work together to coordinate engineering designs.

#### 1.6.2.4 I-66 EIS (Outside the Capital Beltway), VDOT/DRPT (ongoing)

In January 1999, an MIS was completed for the corridor extending along I-66 west of the Capital Beltway. Recommendations included extension of the Metrorail Orange Line from Vienna to Centreville, improvements in bus and VRE commuter rail service, and the addition of general purpose and HOV lanes to I-66. To further examine and develop these proposed improvements, VDOT initiated a Draft EIS in Fall 2001. A Notice of Intent was published in December 2001, and scoping meetings were held in January 2002. VDOT expects to circulate the Draft EIS in mid-2003.

The improvements being examined in the I-66 EIS (if implemented) will have an effect on travel patterns and transit demand in the Dulles Corridor. Accordingly, the study will be closely coordinated with the Dulles Corridor Rapid Transit Project as the two projects advance through future phases of project development.

### 1.6.3 ROLE OF THE DRAFT EIS IN PROJECT DEVELOPMENT

NEPA requires that federal decision-making include consideration of the potential impacts of a proposed project and its alternatives on the natural and human environment. If substantial environmental impacts are anticipated and cannot be avoided, a plan for mitigating these impacts must be proposed. As part of the decision-making process, reasonable alternatives that would avoid or reduce adverse impacts must be considered, analyzed, and documented. In addition, the public must be given adequate opportunity to comment on a proposed project, and the project must be coordinated with appropriate agencies.

The level of documentation required for compliance with NEPA varies depending on the class of the proposed action. Class I actions—such as construction of new highway or rail transit facilities, extensions of rail transit facilities, or construction of separate roadways for buses or HOVs—require the preparation of an EIS. An EIS describes in detail the effects of project actions that would affect the environment, as well as any proposed mitigation.

A primary purpose of this Draft EIS is to assist decision-makers in the selection of a Locally Preferred Alternative (LPA) for the Dulles Corridor Rapid Transit Project. The LPA may be one of the alternatives under consideration—the Baseline or No-Build Alternative, or one of the various Build Alternatives—or it may be a combination of different elements selected from these alternatives. To aid in the selection of the best alternative for the project, the Draft EIS documents the purpose and need for the project; presents a discussion of all the alternatives considered; describes in detail the anticipated social, environmental, economic, and transportation-related effects of the proposed project; and identifies appropriate mitigation measures to offset unavoidable impacts.

The information presented in this Draft EIS is based on numerous preliminary technical studies, and reflects comments or suggestions received in the course of public review and agency coordination activities conducted during the evaluation of alternatives.

#### 1.6.3.1 Environmental Review and Project Development Process

Throughout the preparation of the Draft EIS, DRPT and WMATA worked with local communities and federal, state, and local agencies to identify project area challenges, define project area needs, develop possible alternatives, and assess environmental consequences and potential mitigation. This Draft EIS has been circulated to federal, state, and local agencies as well as the general public to solicit comments. Copies of this document were also made available for review at the local libraries and other community facilities listed in Chapter 11.

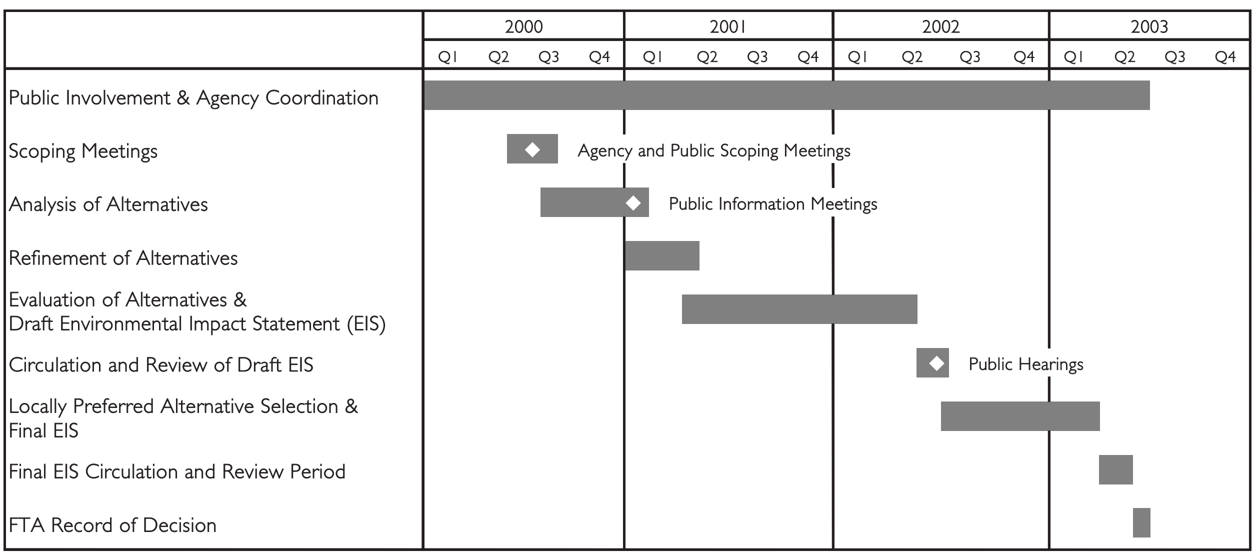
Written comments will be accepted for a period of 45 days from the date of distribution of the Draft EIS and the publication of the formal Notice of Availability in the *Federal Register* and other local newspapers. Comments will also be accepted verbally and in writing at formal public hearings scheduled during the public comment period. Based on the review of the analysis presented in the Draft EIS and comments received, decision-makers will select the LPA for the Dulles Corridor Rapid Transit Project.

The next step in finalizing and implementing the selected LPA will be preparation of a Final EIS to respond to comments and issues raised during the Draft EIS circulation. The Final EIS will present responses to comments received on the Draft EIS and document any additional analysis required by the comments or the selected LPA. The document will be circulated for agency review, and then FTA, as the lead federal agency, will render its formal decision on the proposed project in a Record of Decision. As a cooperating agency, FAA will also use this Draft EIS to satisfy its NEPA responsibilities if one of the Build Alternatives is selected The Records of Decision will identify the action to be undertaken, environmental findings resulting from the proposed action, and mitigation requirements associated with project implementation.

If a Build Alternative is selected as the LPA, then after the Final EIS is filed by FTA in accordance with NEPA, a grant application will be submitted by DRPT to FTA for funding the final design and construction of the project.

The overall environmental review process and schedule are outlined in Figure 1.6-1.

**Figure 1.6-1: Proposed Environmental Review Process and Schedule**




### 1.6.3.2 Decision-Making Bodies and Required Approvals

Several local deliberative bodies are responsible for making decisions during the preliminary engineering and environmental review phase of project development. The Commonwealth Transportation Board (CTB), a 17-member board appointed by the Governor of Virginia, is primarily responsible for locating routes, approving construction contracts, creating traffic regulations, naming highways, and administering and allocating transportation funds in Virginia. CTB's role on the Dulles Corridor Rapid Transit Project is to select the LPA, as appropriate, prior to the issuance of the Record of Decision by FTA and FAA. Selection will be in cooperation with state, regional, and local jurisdictions and agencies.

The WMATA Board of Directors is a six-member board consisting, in part, of two principal Directors from each signatory jurisdiction (Virginia, Maryland, and the District of Columbia). In addition, the board includes six alternate Directors who may act in the absence of the Principal Director. The WMATA Board is responsible for the mass transit plan for the Washington Metropolitan Area Transit Zone, which includes the Dulles Corridor. Concurrently with the CTB's action, the WMATA Board will select the same LPA as part of its process to add the project to the Adopted Regional System for Metrorail.

The Metropolitan Washington Airports Authority (MWAA) Board of Directors is a 12-member board whose mission is to direct the development and operation of Ronald Reagan Washington National Airport and Dulles Airport. In addition to Dulles Airport proper, MWAA operates the DAAR under a long-term lease from the federal government. If a Build Alternative is selected, final approval for use of the airport roadways and land will require approval of the MWAA Board and FAA.

#### 1.6.3.3 Public Involvement

A comprehensive public involvement program was established for the Dulles Corridor Rapid Transit Project to involve the public and appropriate agencies in decision-making throughout the environmental review and preliminary engineering processes.

The public involvement program has included both formal and informal public meetings. Public meetings were held early in the scoping process (July 2000) to allow citizens and agencies to comment on proposed alternatives, propose additional alternatives, and identify issues for consideration in the development of the Draft EIS. Summaries of comments received during scoping and responses are documented in the *Scoping Process Report* (September 2000). Public information meetings were also held at several locations in the corridor during January and February 2001. The purpose of these meetings was to provide information regarding the alternatives developed as a result of the scoping process and to solicit comments on these alternatives. In mid-2002, public hearings will be held to provide opportunities for formal public comment on this Draft EIS and accompanying General Plans.

Several other methods have been employed for encouraging public participation in the project. The project team has regularly given presentations to the general public, interest groups, task forces, and government agencies. Quarterly newsletters and regular updates have been sent to the public regarding the progress of the project. The project website (www.dullestransit.com) has presented updated information and images of the project area. A project kiosk at Tysons Corner Center, the Project Information Center at The Spectrum at Reston Town Center, and displays at many public libraries throughout the Dulles Corridor have offered materials that provide information and solicit feedback about the project, as well as answer questions. In addition, outreach at community events such as fairs and town meetings have been conducted. More detailed information on public involvement is included in Chapter 11.

# Alternatives Considered 2

# 2 ALTERNATIVES CONSIDERED

This chapter describes the alternatives considered for the Dulles Corridor Rapid Transit Project, and defines those alternatives that were evaluated for this Draft Environmental Impact Statement (Draft EIS).

**Section 2.1** summarizes the findings and recommendations of the most recent studies related to transit improvements in the Dulles Corridor.

**Sections 2.2 and 2.3** contain detailed definitions of the alternatives that were carried forward for full evaluation in the Draft EIS: the No-Build (Baseline) Alternative—the alternative against which the Build Alternatives are evaluated—and the Build Alternatives.

**Sections 2.4 and 2.5** present information on the capital costs and operating and maintenance costs associated with the Baseline Alternative and each of the Build Alternatives. The methodologies for developing these costs are briefly outlined.

**Section 2.6** outlines the process used to identify and evaluate the initial list of alternatives for the Dulles Corridor Rapid Transit Project, and summarizes the reasons particular alternatives were eliminated from further consideration.

Finally, **Section 2.7** summarizes key elements of the alternatives that were considered in this Draft EIS.

## 2.1 RECOMMENDATIONS FROM MIS AND SUPPLEMENT

The Virginia Department of Rail and Public Transportation (DRPT) and the Federal Transit Administration (FTA), as part of long-range planning for transportation improvements in the Washington metropolitan region, conducted the *Dulles Corridor Transportation Study*, a Major Investment Study (MIS) completed in 1997. In the MIS, the costs and benefits of various improvement alternatives for the Dulles Corridor were examined and the social, environmental, transportation, and economic effects of the alternatives were reviewed. Based on these evaluations, a preferred alternative for transportation improvement in the Dulles Corridor was identified: a seamless extension of the regional rail system.

DRPT subsequently conducted the *Supplement to the Dulles Corridor Transportation Study* (MIS Supplement) in 1999 to advance the recommendations of the 1997 MIS. During development of the MIS Supplement, DRPT modified the MIS recommendations to include a bus rapid transit (BRT) option, as a means of addressing the immediate transportation needs of the Dulles Corridor.

More detailed information on the numerous alternatives evaluated during the MIS process, and on the reasons particular alternatives were carried forward or eliminated, are presented in the *Final Alternatives Analysis Report* (May 2001) for the Dulles Corridor Rapid Transit Project.

To distinguish between the findings of the two MIS studies, this chapter refers to the *Dulles Corridor Transportation Study* as the MIS and refers to the *Supplement to the Dulles Corridor Transportation Study* as the MIS Supplement. Throughout the rest of the Draft EIS, all recommendations and findings from either the MIS or the MIS Supplement will be referred to collectively as the MIS recommendations and findings.

### 2.1.1 DULLES CORRIDOR TRANSPORTATION STUDY (MIS)

Building on the work of previous studies, the 1997 MIS described and documented a wide range of potential transportation improvements in the Dulles Corridor, including numerous roadway improvements, transit technologies, and transit alignments. As the study progressed, the range of options under consideration focused on the most competitive alternatives: a No-Build alternative, an express bus alternative, and two types of rail alternatives. The rail alignments extended from the Metrorail Orange Line to Route 772 in Loudoun County, and were primarily located in the median of the Dulles Airport Access Road (DAAR). Direct service was provided through Tysons Corner and Washington Dulles International Airport (Dulles Airport).

The conclusions documented in the MIS were that, although the rail alternatives would have much higher costs, rail service would provide greater benefits than the express bus service alternative in terms of service levels, ridership, and support for economic development. Further, the MIS concluded that a Metrorail alternative would be the most cost-effective rail alternative because other rail technologies would require a transfer at the Metrorail Orange Line, reducing the service and ridership benefits of the improvement.

The recommended Metrorail alternative connected to the Metrorail Orange Line at a point between the East Falls Church and West Falls Church stations. From here, the alignment proceeded west along the median of the Dulles Connector Road to Route 123, where it diverged to serve the core of Tysons Corner, running along Route 123 and Route 7 on both elevated and underground structures before converging with the DAAR near the Route 7 interchange. The alignment then followed the DAAR median to Route 28 near the Loudoun County border, where it again diverged and entered a tunnel section to serve Dulles Airport. At the airport terminal, the alignment turned north and surfaced northwest of the terminal, continuing to the median of the Dulles Greenway (a privately owned extension of the Dulles Toll Road in Loudoun County). The alignment followed the Greenway to the terminus of the rail line at Route 772.

The MIS rail alignment included 10 stations: 3 located in Tysons Corner, 1 at Dulles Airport, and 6 near major interchanges and activity centers along the DAAR and the Dulles Greenway. An eleventh station at Wolf Trap Farm Park was identified as a possible station dependent on funding by others. The MIS recommendations also included four potential sites for a rail service and inspection yard.

Based on the preliminary findings reported prior to publication of the MIS and on public input, the Policy Advisory Committee for the Dulles Corridor Transportation Study identified a preferred alternative and made the following recommendations to the Commonwealth Transportation Board (CTB) on June 10, 1996:

- Develop a seamless extension of the regional rail system with Metro-like facilities from West Falls Church Station to the vicinity of Route 772 in Loudoun County.
- Develop a funding strategy for long-term capital and operating costs of the preferred alternative.
- Develop a strategy for including the preferred alternative in the long-range transportation plan for the Washington metropolitan region.

- Develop a funding strategy for near-term implementation of enhanced express bus services in the corridor to (1) provide immediate response to continued growth in the corridor and (2) further develop the transit market for the rail line.

The CTB adopted the recommendations of the Policy Advisory Committee on August 15, 1996, and directed the inclusion of the project in the State's Transportation Improvement Plan. The CTB further authorized DRPT to take whatever steps necessary to carry out preliminary engineering for the preferred alternative. The project was subsequently added to the region's constrained long-range plan (CLRP).

### 2.1.2 SUPPLEMENT TO THE DULLES CORRIDOR TRANSPORTATION STUDY

During development of the 1999 MIS Supplement, DRPT modified the MIS recommendations to address the immediate transportation needs of the Dulles Corridor. The MIS Supplement presented a phased implementation program that included express bus improvements and a BRT system that would ultimately be converted to rail for the full length of the Dulles Corridor.

The MIS Supplement study team considered a large number of BRT options. These options ranged from a low-end system that would continue expansion of express bus improvements, to a high-end system with many of the amenities and advantages of Metrorail. Analysis of these options led DRPT to conclude that BRT was best suited as an interim transit solution in the Dulles Corridor. The public's desire for Metrorail service, as well as the findings reported in the MIS, confirmed that rail was the best long-term alternative for improving mobility in the corridor. However, BRT was considered appropriate and desirable as part of a phased implementation program leading to the development of rail in the corridor. DRPT, therefore, recommended a four-phase approach to advance rail development while meeting the immediate and near-term transit needs of the corridor with BRT service:

- **Phase I.** Express bus service between activity centers in Fairfax County.
- **Phase II.** Enhanced express bus service between activity centers in Fairfax and Loudoun counties, including Dulles Airport.
- **Phase III.** BRT between the West Falls Church Metrorail Station and activity centers in Fairfax and Loudoun counties, including Tysons Corner and Dulles Airport, via the DAAR and the Dulles Connector Road.
- **Phase IV-A.** Rail through Tysons Corner and BRT through the remainder of the corridor.
- **Phase IV-B.** Rail through the entire corridor, including service to Dulles Airport and Loudoun County, and feeder bus service to rail stations.

In 1999, Fairfax County implemented the Phase I express bus service. Fairfax and Loudoun counties implemented the Phase II enhanced express bus service in 2001.

The recommended Phase III BRT system followed an alignment similar to the MIS preferred rail alternative. However, the BRT alignment would connect to West Falls Church Metrorail Station and would serve Tysons Corner via a median station near Spring Hill Road, rather than serving the core of Tysons Corner directly. In addition, existing north-south and east-west service roads, rather than an underground tunnel, would serve Dulles Airport.

The MIS Supplement study team determined that operating BRT in the core of Tysons Corner would not be cost-effective. An at-grade system would not be practical or reliable, because the high volumes of traffic in Tysons Corner would likely slow bus operations. BRT operations in the core of Tysons Corner would have to be grade-separated to be effective. Given the difficulties in converting an elevated BRT guideway into Metrorail, the substantial costs of right-of-way acquisition and construction for such a grade-separated system would likely be forgone when the rail segment through Tysons Corner was built.

The recommended BRT alternative included four stations and three stops. The stations were located in the DAAR median and, with the exception of the Spring Hill Road Station, were convertible to rail stations as the phased implementation progressed. Stops were locations where the buses would leave the DAAR or the Dulles Greenway to access the Dulles Airport terminal and park-and-ride facilities adjacent to the highway in Loudoun County.

A combination of BRT and Metrorail was recommended as Phase IV-A. Metrorail would replace the BRT system from the Orange Line through Tysons Corner, extending along Routes 123 and 7 and connecting to BRT at a BRT/Metrorail transfer facility at the western edge of Tysons Corner. Metrorail for the full length of the corridor was recommended as Phase IV-B, the final phase, this phase was essentially the same as the MIS preferred alternative.

During the development of the MIS Supplement, the Washington Metropolitan Area Transit Authority (WMATA) introduced an alternative rail alignment for serving Tysons Corner. This alignment consisted of a one-way pair of single-track alignments, forming a loop. The southern leg of the loop followed Routes 123 and 7 like the MIS alignment. The northern leg of the loop followed Westpark Drive. The loop alignment had six stations, four of which provided one-way service only.

After completion of the MIS Supplement, the CTB adopted the recommended revisions to the MIS on September 15, 1999, and directed that the revisions be included in the State's Transportation Improvement Plan. CTB authorized DRPT to proceed with development of a funding plan, and to begin working toward preliminary engineering and the environmental analysis related to the requirements of the *National Environmental Policy Act of 1969* (NEPA) for the Dulles Corridor Rapid Transit Project.

## 2.2 BASELINE ALTERNATIVE

The Baseline Alternative includes all existing highway and transit infrastructure and services within the corridor, and any that are committed to be implemented by 2025, aside from the Dulles Corridor Rapid Transit Project. The Baseline Alternative is the No-Build condition for the corridor, and includes the following elements:

- Existing highways;
- Existing Metrorail infrastructure;
- Existing WMATA, Fairfax Connector, and Loudoun County bus services;
- Fairfax and Loudoun counties' transit improvements included in Phase II (Enhanced Express Bus) of the Dulles Corridor phased implementation program;
- Planned highway and transit improvements through 2025 included in the Metropolitan Washington Council of Government's (MWCOG's) 2000 financially constrained long-range plan (CLRP); and

- Marginal increases in transit service and capacity commensurate with forecast population growth in the corridor through 2025.

This Baseline Alternative is consistent with both the "no-action alternative" required by the Council of Environmental Quality's (CEQ's) regulations for implementing NEPA, and the "baseline alternative" defined in FTA's final rule on Major Capital Transit Investment Projects (New Starts). Highway and transit improvements included in the Baseline Alternative are identified in the region's CLRP. Additional capacity improvements to the existing Metrorail system needed to meet forecast increases in travel demand are also included in the Baseline Alternative.

The highway and transit networks defined for the Baseline Alternative are also used as a starting point for each of the Build Alternatives studied for the Dulles Corridor Rapid Transit Project. The baseline network differs from the network for a specific build alternative by the amount of proposed investment in transit services and facilities in the respective Build Alternatives.

### 2.2.1 BASELINE TRANSIT NETWORK

The Baseline Alternative for the project includes all existing transit facilities in the region, as well as transit improvements included in local transit plans and in the CLRP through 2025. The Baseline Alternative also assumes the implementation of any improvements to the existing Metrorail system needed to meet forecast travel demand. The following section summarizes existing and planned transit services and facilities for both the corridor and the greater Washington metropolitan region. The baseline bus network within the Dulles Corridor is shown in Figure 2.2-1 with routes identified by transit service provider. Additional information on planned transit improvements is provided in Chapter 6.

#### 2.2.1.1 Existing Transit Service and Facilities in the Corridor

Three transit providers currently serve the Dulles Corridor: Fairfax County, Loudoun County, and WMATA. In 2001, the services included the following:

- Fairfax County's Connector service operates 30 routes in the corridor, including a) express bus service operating in the Dulles Toll Road and DAAR, connecting major park-and-ride facilities in Herndon and Reston with Tysons Corner, the West Falls Church Metrorail Station, and the Pentagon Metrorail Station; and b) feeder bus and circulator services operating within Herndon, Reston, and Tysons Corner. Fairfax Connector operates approximately 166,000 revenue hours annually in the corridor, with a peak-period requirement of 65 buses. Current service represents a significant increase over 1998 service (65,000 hours of annual revenue service, 43 peak-period buses). Fairfax Connector ridership in the corridor averages approximately 10,000 weekday passengers.
- Loudoun County contracts with a private provider to operate 11 peak-period express bus trips each weekday between communities within the county and Washington, D.C. This service results in approximately 12,000 annual hours of revenue service and 800 average weekday passengers.
- WMATA operates 14 regional bus routes, which either begin or end in the Dulles Corridor. Most of this service provides connections to Tysons Corner, with some circulation within the Tysons area. Recent service improvements include express bus service from Bethesda, MD to Tysons Corner and from Washington, D.C. to Dulles Airport.

Several major intermodal facilities are located in the corridor, including the Dulles North Transit Center in Loudoun County at the Route 606/Dulles Greenway interchange; the Herndon-Monroe Park-and-Ride lot in Herndon; three park-and-ride lots in Reston (Reston South, Reston East, and Reston North); and the Tysons-West*Park Transit Station in Tysons Corner, which provides Kiss & Ride (drop off/pick-up) access to Fairfax Connector and WMATA service, but no parking. In addition, the Metrorail Orange Line serves the eastern end of the corridor. Parking and bus transfer facilities are located at the East Falls Church and West Falls Church Metrorail stations. Additional Metrorail Orange Line facilities—the Dunn Loring and Vienna stations—are located farther west along I-66.

The eastbound shoulder on the Dulles Connector Road between Magarity Road and the West Falls Church Metrorail Station has been reinforced and widened to allow buses to bypass congestion to improve service reliability.

#### 2.2.1.2 Planned Transit Improvements in the Corridor

Planned transit improvements in the corridor include all bus and ancillary facilities (e.g., park-and-ride lots) in the region's CLRP, minus the later phases of the Dulles Corridor Rapid Transit Project (Phases III and IV in the CLRP). The Baseline Alternative does include express bus improvements from earlier phases of the Dulles Corridor phased implementation program (Phase II in the CLRP), as well as additional bus service proposed for Fairfax and Loudoun counties to meet forecast growth in population and employment. Specific improvements include:

- **New Bus Access Slip Ramps** – Construction of three new bus-only, at-grade ramps to allow for bus access between the DAAR and the Dulles Toll Road and to improve safety and schedule reliability. The new slip ramps will begin operation by early 2003.
- **Enhancements to Fairfax County Dulles Corridor Express Bus Service** – Fairfax County will increase bus service in the Dulles Corridor in 2002. Service enhancements include improved peak and midday headways for Reston circulator services and an increase in peak-period service from Reston to the Tysons Corner Center and the West Falls Church Metrorail station.
- **New Loudoun County Express Bus Service** – Loudoun County added new express bus routes to its existing service in 2001, connecting various points in the county and downtown Washington, D.C. The Baseline Alternative also includes additional peak-period, two-way transit service between the Dulles North Transit Center and West Falls Church Metrorail Station, as well as feeder bus service between the Dulles North Transit Center and the residential communities of Ashburn and the Cascades. These services are included in Loudoun County's longer-term transit expansion plans.

More information on assumed Baseline bus transit service in the corridor is included in the *Transit Operations and Maintenance Plan* (June 2002).

With the exception of the Reston East Park-and-Ride lot, the existing park-and-ride facilities in the corridor will remain at their current size. Fairfax County plans to expand the Reston East Park-and-Ride to include a multi-level garage with 2,300 spaces by 2010.

In addition, WMATA implemented service changes for Tysons Corner bus routes in mid-2001. These changes reflect a restructuring of service (including the shortening of some routes) to improve on-time performance.

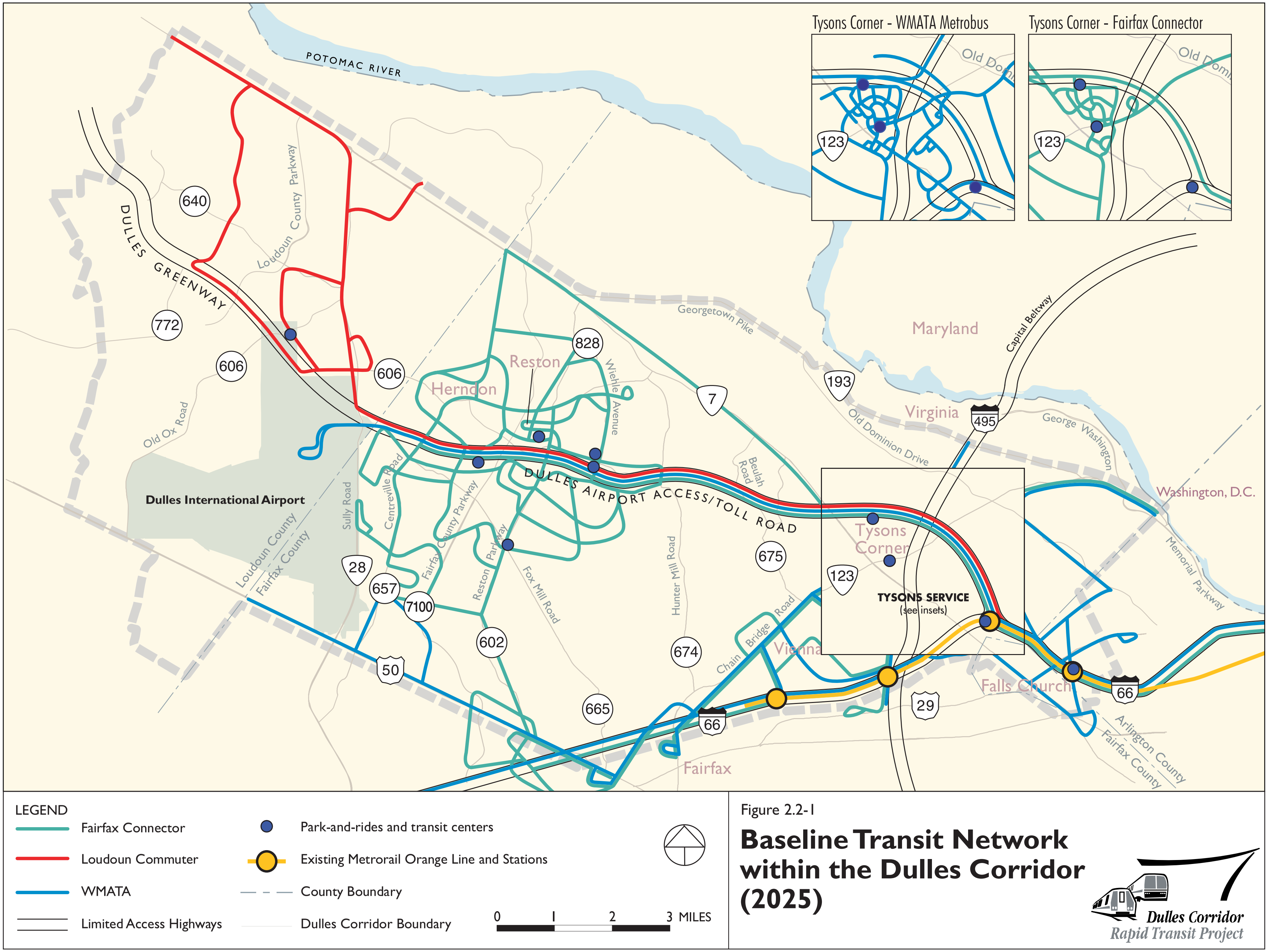



Figure 2.2-1

## Baseline Transit Network within the Dulles Corridor (2025)

Dulles Corridor *Rapid Transit Project*

#### 2.2.1.3 Other Existing and Planned Services and Facilities in the Region

Several other public transportation systems and services are included in the Baseline Alternative. These services and facilities include:

- The existing 103-mile Metrorail system;
- Commuter rail service operated by Virginia Railway Express (VRE) and Maryland Commuter Rail (MARC); and
- Local bus service provided by WMATA; Montgomery County, MD (Ride-On); the City of Alexandria, VA (DASH); and Fairfax County, VA (Fairfax Connector, RIBS).

Other transit improvements are planned for the larger Washington metropolitan region, and are included in the definition of the Baseline Alternative:

- New Metrorail Station at New York Avenue in Washington, D.C.;
- New Metrorail/VRE station at Potomac Yards in Arlington, VA;
- Blue Line Metrorail extension to Largo, MD;
- New VRE station in western Fairfax County, VA;
- MARC rail extension to Point of Rocks, MD;
- New MARC station at Route 355/Randolph Road in Rockville, MD; and
- Georgetown Branch Trolley from Bethesda to Silver Spring, MD.

The proposed extension of the Metrorail Orange Line from Vienna to Centreville, currently being studied by VDOT and DRPT, is not currently in the CLRP. Therefore it is not included in the Baseline Alternative.

#### 2.2.1.4 Assumed Operational Improvements for Regional Rail

Assumptions for Metrorail operating conditions under the Baseline Alternative include the following elements:

- Increased peak-period train frequencies (4 minutes compared to current 6-minute service) on the Red, Green, and Yellow lines beginning in 2015. Corresponding increases in base, evening, and weekend service frequency on the same lines would also occur.
- Current supplemental peak-hour service between West Falls Church and New Carrollton on the Orange Line is replaced with rail service that operates in the peak-period in both directions between the West Falls Church and Stadium-Armory stations. This supplemental service would operate every 6 minutes, in conjunction with 6-minute service between Vienna and New Carrollton. This combination would result in 3-minute headways on the Orange Line between the West Falls Church and Stadium-Armory stations.

In addition, the Baseline Alternative assumes improvements that will allow the regional Metrorail system to continue to meet passenger demand for rail transit service through 2025, with passenger loads as close as possible to desired standards. The full scope and cost of these needed improvements were only partially known at the time the 2000 CLRP was adopted. However, WMATA recently conducted the Metrorail Core Capacity Study, which determined the capacity limits of the existing Metrorail system and which related projected ridership growth to system capacity. Study recommendations focused on improvements that would maximize the peak period capacity of the existing system, such as implementation of eight-car train operations and

associated improvements. WMATA is currently developing an improvement program that incorporates the Core Capacity Study recommendations, and reflects the funding capacities of WMATA Compact member jurisdictions. This improvement program will be part of the WMATA contribution to the 2003 update of the CLRP. (See Chapter 1 for additional detail on the Core Capacity Study.)

Several of the Core Capacity Study recommendations are assumed as part of the Baseline Alternative. These improvements include the expansion of peak-period train consists on the Orange and Blue lines from six to eight cars, the associated upgrade of traction power systems, and other related improvements required to operate the longer trains.

### 2.2.2 BASELINE HIGHWAY NETWORK

The baseline highway network includes existing highways and other major roadways in the region, as well as all regionally significant highway capacity improvements currently included in the region's 2000 CLRP. This baseline highway network is assumed for all Dulles Corridor alternatives being studied. The following sections summarize the major highways, arterials, and other important roadway facilities within the Dulles Corridor. These roadways are depicted in Figure 2.2-2. Additional information on existing roadways and planned improvements is provided in Section 6.1.

#### 2.2.2.1 Existing and Planned Highway Facilities in the Corridor

Several highways are located in the Dulles Corridor. The following describes these major highway facilities, their existing capacity, and planned improvements included in the CLRP.

- **Interstate 66** – Inside the Capital Beltway, I-66 is a four-lane, limited-access facility connecting Washington, D.C. with Arlington and eastern Fairfax counties. High-occupancy vehicle restrictions (HOV-2) are in effect on both inbound lanes each weekday morning, and on both outbound lanes each evening peak period. Outside of the Beltway, I-66 is a six-lane facility in non-peak periods. The shoulder of the roadway is open to traffic in the a.m. (inbound) and p.m. (outbound) peak periods. HOV-2 restrictions (two persons per vehicle) are also in effect for one lane in the a.m. (inbound) and p.m. (outbound) peak periods.
- **Dulles Connector Road** – This four-lane facility is restricted to traffic using eastbound I-66, the Capital Beltway, Route 123, the Dulles Toll Road, and the DAAR. In the eastbound direction, the shoulder of the Connector Road has been widened and reinforced, and buses are permitted to use it during periods of severe congestion.
- **Interstate 495 (the Capital Beltway)** – This is an eight-lane circumferential facility serving the entire metropolitan area. Within the corridor, I-495 links Tysons Corner with westbound I-66, the Dulles Toll Road, and with communities to the south and east of the corridor. Capacity improvements, including the addition of an HOV lane in each direction, are planned for I-495 between the I-395/I-495/I-95 interchange and the American Legion Bridge, including ramps providing direct HOV access through Tysons Corner at Route 123. Implementation of these improvements is anticipated by 2010.
- **Dulles Toll Road** – This eight-lane toll facility serves the communities of Vienna, Reston, and Herndon between Tysons Corner and the Fairfax/Loudoun county border. Peak-period HOV-2 restrictions are in effect on one lane in the a.m. (inbound) and p.m. (outbound) peak periods. Interchange improvements are planned at Hunter Mill Road and Spring Hill Road by 2005. The

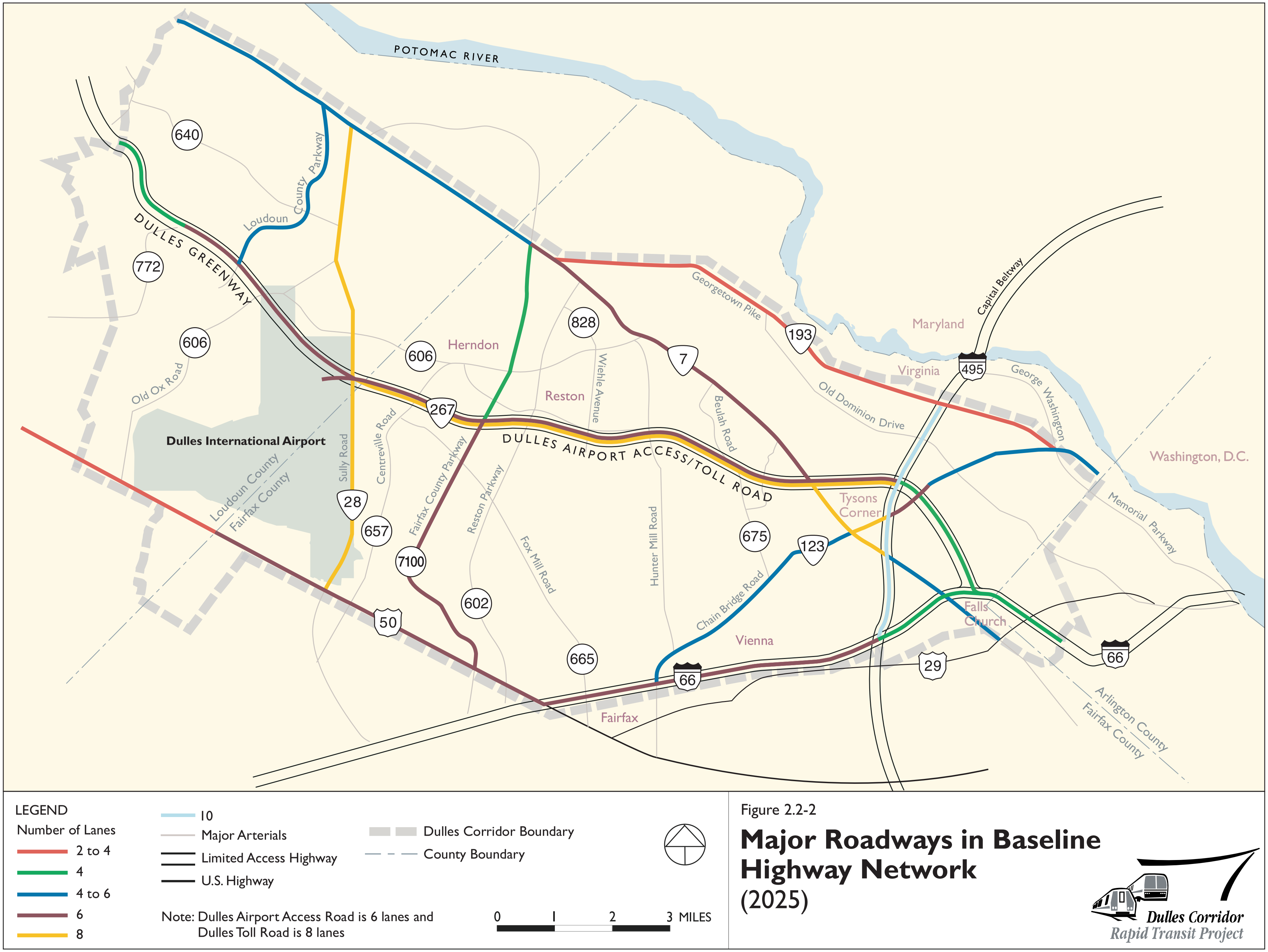



Figure 2.2-2

# Major Roadways in Baseline Highway Network (2025)

current toll on the Toll Road ranges from $0.25 to $0.85 for passenger vehicles. Bonds used to construct the Toll Road are set to expire in 2016.

- **Dulles Airport Access Road (DAAR)** – This is a four-lane facility in the median of the Dulles Toll Road. The DAAR is owned by the federal government and operated by MWAA. Use of the DAAR is restricted to passengers, customers, and personnel of Dulles Airport. MWAA is planning to add an additional lane in each direction on the DAAR after 2010, or when average daily traffic on the facility degrades to an unacceptable level.
- **Dulles Greenway** – This is a four- to six-lane privately owned and operated toll facility extending west to Route 7 in Leesburg, Virginia. Tolls on the Greenway range from $0.75 to $2.00, depending on point of entry and method of payment. A third lane in the eastbound direction between Route 772 and the mainline toll plaza opened in December 2000. Construction of a third westbound lane is expected to be completed by 2003.

#### 2.2.2.2 Other Significant Regional Roadways

In addition to the highways described above, several other major arterials serving regional travel patterns are located within the Dulles Corridor.

- **Route 7 (Leesburg Pike)** – This is a four- to six-lane facility generally parallel with the Dulles Connector Road from the West Falls Church Metrorail Station into and through Tysons Corner, where it crosses the Toll Road and continues northwest into northern Fairfax and Loudoun counties. Route 7 within Tysons Corner is planned for expansion from six to eight lanes by 2010. Route 7 is also planned for expansion from four to six lanes between Reston Parkway and the Dulles Toll Road, and Rolling Holly Drive and Reston Parkway.
- **Route 123 (Chain Bridge Road/Dolley Madison Boulevard)** – This is a four- to six-lane facility linking Tysons Corner with the communities of McLean to the east and Vienna to the west. Route 123 within Tysons is planned for expansion to six to eight lanes between Route 7 and I-495, and from four to six lanes between I-495 and the Dulles Connector Road. All improvements are assumed to be implemented by 2010.
- **Route 193 (Georgetown Pike)** – This is a two- to four-lane facility connecting Route 123 in eastern McLean with Route 7 in Great Falls. Route 193 serves as the northern boundary of the corridor study area.
- **Route 7100 (Fairfax County Parkway)** – This is a four-lane arterial that runs north-south through the corridor study area between I-66 and Route 7. Route 7100 is planned for expansion from four to six lanes between I-66 and Sunrise Valley Drive by 2010.
- **Route 28 (Centreville Road/Sully Road)** – This is a six-lane, north-south arterial running parallel to the eastern boundary of Dulles Airport between Route 50 and the Dulles Toll Road, continuing north to Route 7. Several improvements are planned on Route 28 within the corridor by 2005, including the replacement of all at-grade intersections with interchanges and the addition of two general-purpose lanes in each direction.
- **Route 50 (Lee-Jackson Memorial Highway)** – This is a four- to six-lane, east-west arterial running between I-66 and Route 28, forming the far southwest boundary of the corridor study area. A segment of Route 50 between Old Lee Road and the Fairfax/Loudoun county border is planned for expansion from four to six lanes by 2020.

- **Loudoun County Parkway** – This is a two- to four-lane, north-south roadway, which will link the Dulles Greenway and Route 7, and be widened to a four- to six-lane facility, by 2010.

## 2.3 BUILD ALTERNATIVES

Based on the MIS recommendations and findings, and the outcome of the alternatives evaluation process for this Draft EIS (discussed in Section 2.6), the Build Alternatives include:

- **BRT Alternative.** BRT would extend the full length of the Dulles Corridor between the West Falls Church Station on the Metrorail Orange Line and Route 772 in Loudoun County.
- **Metrorail Alternative.** Metrorail would extend the full length of the corridor from a point between the East and West Falls Church stations on the Orange Line to Route 772.
- **BRT/Metrorail Alternative.** Metrorail would extend from a point between the East and West Falls Church stations on the Orange Line through Tysons Corner, and BRT would operate through the remainder of the corridor, from Tysons Corner to Route 772.
- **Phased Implementation Alternative.** Metrorail would be implemented for the full length of the corridor through a staged series of rapid transit improvements. Initially BRT would extend from West Falls Church Station on the Orange Line to Route 772 in Loudoun County. Next, Metrorail would replace BRT service from West Falls Church Station through Tysons Corner, while BRT would continue to operate from Tysons Corner to Route 772. Finally, Metrorail would replace BRT service between Tysons Corner and Route 772.

For ease of presentation and discussion, the Dulles Corridor has been divided into five geographic sections, as outlined in Table 2.3-1. For clarity, the proposed maintenance and storage facilities, and other ancillary facilities, are discussed in separate sections rather than as part of their corresponding geographic sections.

Detailed engineering drawings and station plans for the BRT and Metrorail alignments and facilities discussed in Sections 2.3.1 through 2.3.4 are presented in Volumes III and IV of the Draft EIS (General Plans).

**Table 2.3-1: Boundaries of Geographic Sections for Dulles Corridor**

| Section | From | To |
|---|---|---|
| Orange Line Connection | Metrorail Orange Line | Dulles Connector Road/Route 123 |
| Tysons Corner | Dulles Connector Road/Route 123 | Route 7/DAAR |
| Mid-Corridor | Route 7/DAAR | DAAR/Route 28 |
| Dulles Airport | DAAR/Route 28 | Dulles Airport North-South Service Road/Dulles Greenway |
| Loudoun County | Dulles Airport North-South Service Road/Dulles Greenway | Dulles Greenway/Route 772 |

### 2.3.1 BRT ALTERNATIVE

The BRT Alternative, with its alignment options, is shown in Figures 2.3-1a and 2.3-1b. The alignment generally extends along the Dulles Connector Road, the DAAR, and the Dulles Greenway, providing service from the Metrorail Orange Line to Route 772 in Loudoun County. On each of these roads, buses would travel in the regular traffic lanes, except in the eastbound direction on the Dulles Connector Road, where buses are

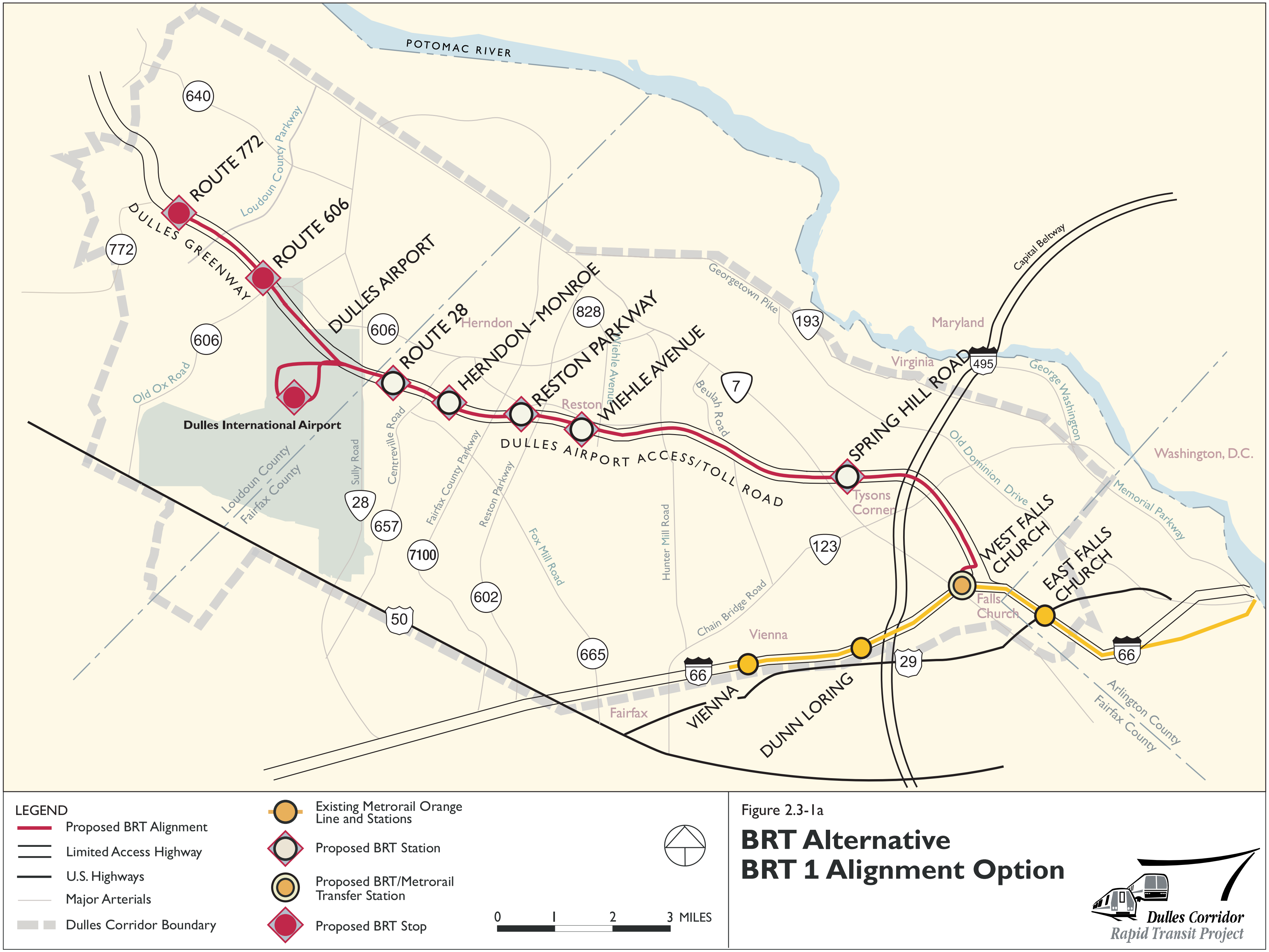



Figure 2.3-1a

**BRT Alternative**
**BRT 1 Alignment Option**

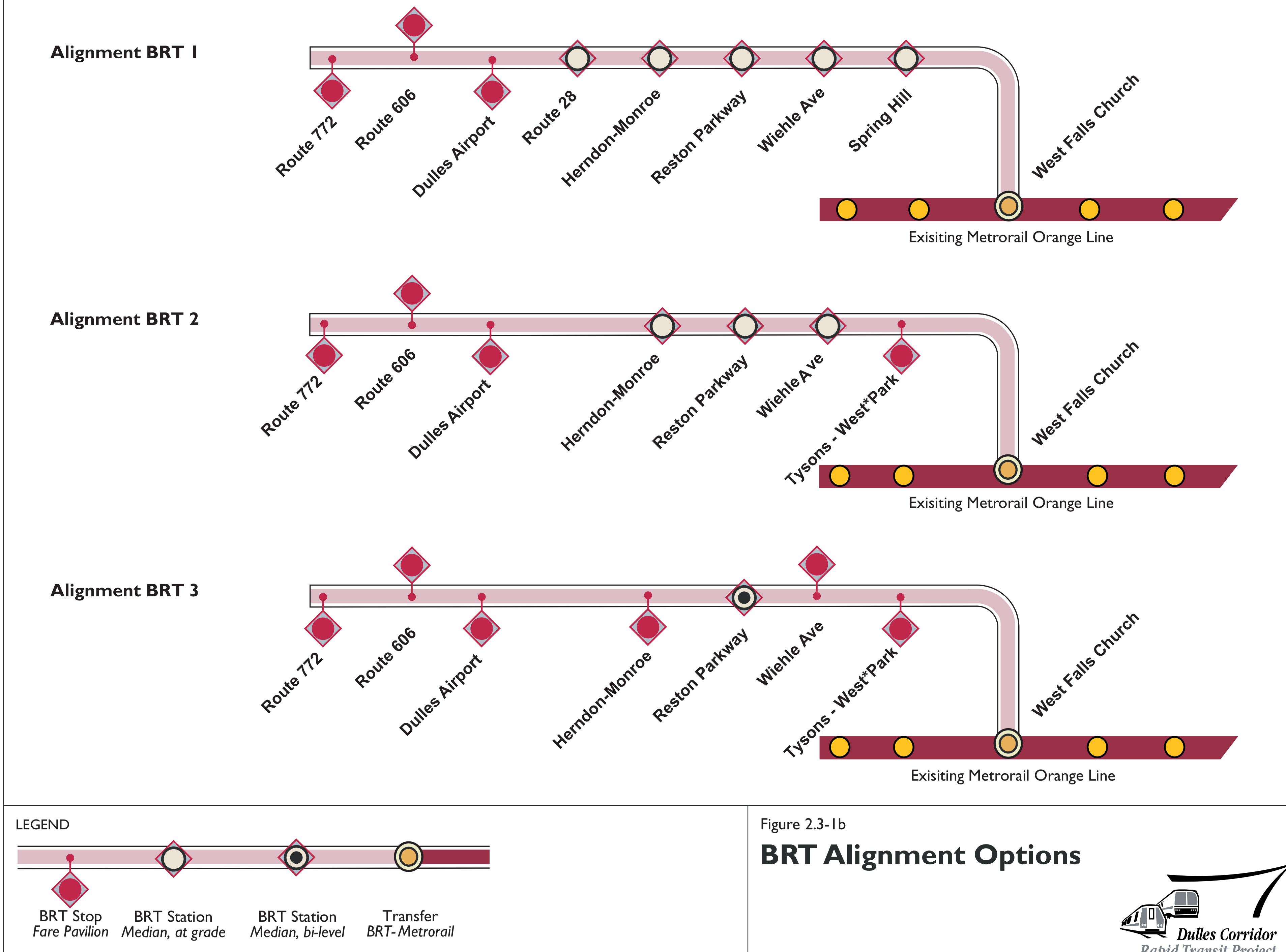



Figure 2.3-1b

## BRT Alignment Options

Dulles Corridor
Rapid Transit Project

permitted to use the shoulder during periods of severe congestion, when such use does not present a safety hazard to general-purpose traffic. This will be no different than bus operations on the shoulder today. Some BRT vehicles would also use the HOV lanes of the Dulles Toll Road, in certain limited areas between Route 28 and Route 7. At Dulles Airport, buses would use the existing airport access roads to reach the terminal. Operations for the BRT Alternative are expected to begin in 2005.

Three different alignment options are under consideration for the BRT Alternative: BRT 1, BRT 2, and BRT 3. BRT 1 is the BRT alignment carried forward from the alternatives screening process. BRT 2 and BRT 3 were design refinements developed subsequent to the publication of the *Final Alternatives Analysis Report*, as part of the ongoing preliminary engineering process. The alignments were designed to offer additional cost savings while still providing improved transportation service in the corridor. The primary difference between BRT 1, 2, and 3 are the number and location of stations and stops, as shown in Figure 2.3-1b. BRT stations are located in the median of the DAAR, whereas BRT stops would be located at park-and-ride facilities outside the DAAR and its median. BRT vehicles would reach stops by leaving the DAAR or the Greenway.

All three BRT alignments were designed to allow for future conversion to rail as demand in the Dulles Corridor grows. For the purposes of this discussion, BRT 2 is closest to the system that would be constructed if BRT were to be implemented without any provisions for rail conversion. This is because the stations within the DAAR median, are limited to the platform length and ancillary space sufficient to support BRT operations.

For all alignment options, the BRT Alternative includes modifications to West Falls Church Station, modifications to existing park-and-ride facilities along the DAAR, and a new BRT Maintenance and Storage Facility.

#### 2.3.1.1 BRT Technology Characteristics

BRT is a bus-based transit system with operating characteristics that are similar to a rail system. Passengers on BRT are provided rail-like amenities, which could include a combination of off-board fare collection, level boarding, enhanced stations and platforms, and real-time information about service and schedules. Because it often takes advantage of existing roadway facilities, BRT is generally a lower-cost transit technology than rail.

For the Dulles Corridor Rapid Transit Project, the BRT Alternative would use specialized BRT vehicles with a color scheme and logo design that is uniquely identifiable. Vehicles would be 60-foot, articulated, low-floor, diesel buses. Buses would have multiple-door boarding and may have doors on the right or left side of the bus to facilitate operations at stations and stops. The passenger capacity of the vehicles would depend on the vehicle selected for service and would vary depending on the configuration of the doors. For this analysis, BRT vehicles are assumed to have a seating capacity of 61 passengers. A photograph of a representative BRT vehicle is shown in Figure 2.3-2.

In the U.S., transit buses are usually configured with two or more doors on the right side. These buses generally require passengers to board the bus through the front door and pay a fare on the bus. Rear doors are used for exiting passengers only. This design tends to create a queue of passengers waiting to board the bus in peak periods and lengthens the trip time for all passengers.

The BRT Alternative would have several features designed to expedite the boarding and alighting process. One major feature of the BRT system is off-board fare collection. Similar to the rest of the regional Metrorail system, BRT passengers would enter the system using either a magnetic farecard or a computer chip-based "smart" card.

The second feature of the BRT system that would improve trip times is use of low-floor buses. Approximately 70 percent of the bus would have a floor roughly 12 to 15 inches above the street level. BRT station platforms would also be at this approximate height to allow passengers to more easily enter and exit the bus. A vehicle-mounted, retractable ramp would be deployed to accommodate patrons in wheelchairs.

Some BRT systems pair low-floor buses with precision docking systems to allow for level boarding. For these systems, the horizontal and vertical gap between the bus doors and the station platform is minimal, easing boarding for all and allowing patrons in wheelchairs to board without use of ramps or lifts. For the Dulles Corridor Rapid Transit Project, level boarding concepts are currently being explored for BRT stations in the median of the DAAR. The final determination will be made during preliminary engineering.

The Dulles Corridor BRT system would also feature multi-door boarding. Because fare collection is not required on the bus, all doors can be used for boarding as well as alighting (exiting).

Two different door configurations are being considered for the BRT Alternative. One is a traditional configuration, which has three doors on the right side of the bus. One door is located in the front near the operator, a second door is in the rear of the first section of the vehicle, and the third door is in the trailer section of the bus (see Figure 2.3-2). The second configuration is an option with doors on the left side of the bus. One door would be located at the back of the first section and one would be in the trailer section. The left-door buses would also have one door on the right side in the front near the bus operator, and it would be possible to convert the buses to traditional right-door buses by means of "knock out" panels on the right side.

The left-door configuration is being explored because it would improve operational efficiency at median stations; however, left-door buses could cost more than right-door buses. On the other hand, use of right-door BRT vehicles at median stations may require investment in traffic signal priority equipment and/or other operating technology.

#### 2.3.1.2 BRT Station/Stop Characteristics

The BRT system would have two basic station configurations: BRT stations and BRT stops.

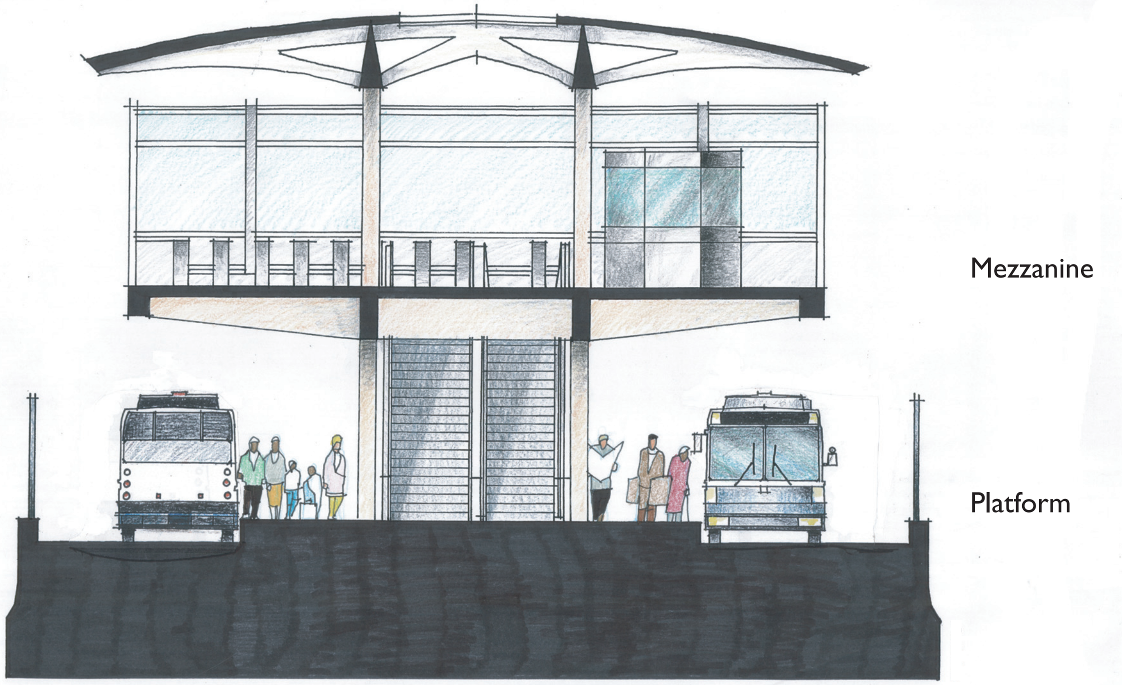
BRT stations would be similar to Metrorail stations. They would have a center-platform configuration, and would be located in the DAAR median at or near grade. BRT platforms would be at least 260 feet long, though many would be longer depending on the location of elements such as elevators and escalators at each station. A 260-foot platform can accommodate four 60-foot articulated BRT vehicles. Stations would also include a mezzanine level with faregates and ticket-vending equipment identical to that already in use on the Metrorail system. Elevators, stairs, and escalators would provide vertical circulation between the mezzanine and platform levels. Space for service rooms would be provided on the platform and mezzanine levels. The similarities between a median Metrorail station and the proposed BRT station are shown in the station cross-sections depicted in Figure 2.3-3.

Pedestrian bridges would provide access to stations, allowing passengers to cross highways and busy arterials. At the station end, these bridges would connect to the mezzanine level and at the opposite end they would connect to entrance pavilions. Entrance pavilions would be multi-level structures that include elevators, and escalators and/or stairs. Entrance pavilions would vary in size depending on the height difference between the pedestrian bridge and the ground.

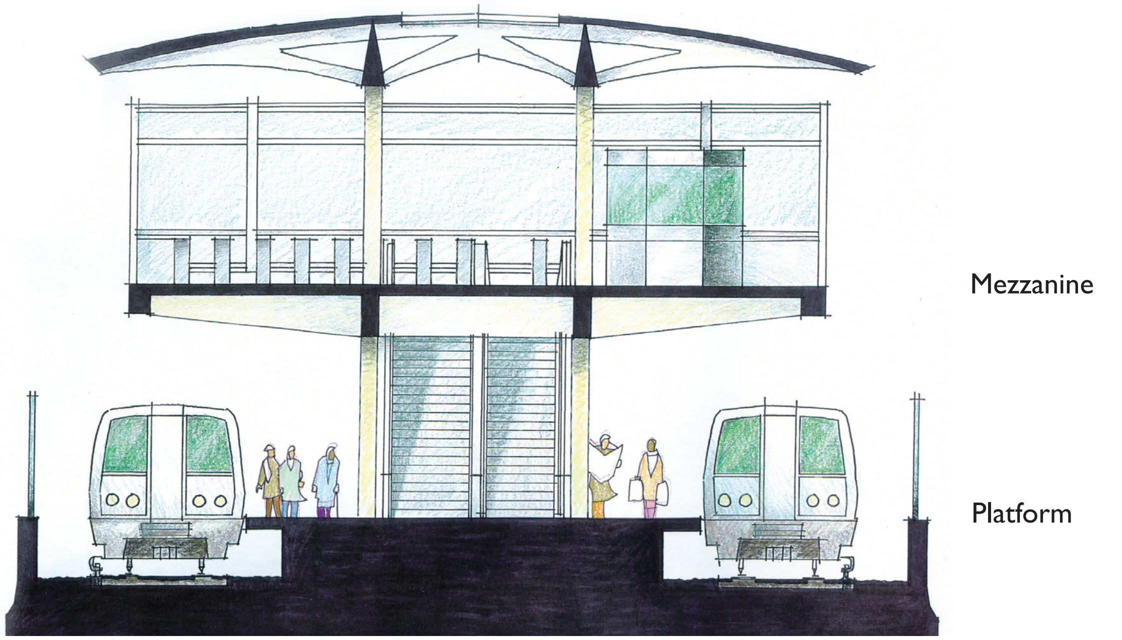

Val de Marne, France

Figure 2.3-2

## Representative BRT Vehicle with Articulation




**BRT**
(doors on right side)




**Metrorail**

Figure 2.3-3

## Typical Median Stations - BRT and Metrorail

Dulles Corridor
Rapid Transit Project

In addition to the entrance pavilions, most station facilities would include bus bays for feeder buses. Some locations would include short-term parking, Kiss & Ride spaces for passenger pick-up and drop-off, provisions for taxis, and park-and-ride facilities for long-term parking. Long-term parking would include accessible spaces for disabled persons.

As shown in Figure 2.3-4, BRT stops (as opposed to BRT stations) would be located outside the DAAR median and would not include pedestrian bridges. BRT vehicles would directly access the stops, picking up and dropping off passengers at bays specifically designed for BRT vehicles. Passengers would access these boarding areas by passing through a one-story structure known as a fare pavilion. The fare pavilion would include ticket vending machines and a faregate array. BRT stops may also include bus bays for feeder buses, a Kiss & Ride area or short-term parking, and commuter park-and-ride spaces.

#### 2.3.1.3 BRT Alignments and Stations/Stops

##### Orange Line Connection

The BRT Alternative would connect to the Orange Line at West Falls Church Station, where a transfer would be required to connect to the Metrorail system. BRT vehicles would access the station's north bus loop via the existing bus-only ramps from the Dulles Connector Road. The three BRT alignments would be identical for this section of the BRT Alternative.

The north bus loop would be reconfigured to include additional bays to handle BRT vehicles. For the opening year of BRT operations, the loop would be modified to include five bays for BRT vehicles, and the existing access driveway would be extended to the west to accommodate the articulated vehicles. By 2025, additional modifications would be required to support anticipated ridership demands. Four additional BRT bays would be constructed and a new underpass would be added to provide a dedicated entrance roadway to accommodate increased transit traffic. The existing access road would be converted to an exit-only roadway. Additional modifications would be made to the bus loop and the existing entrance.

The design of the north bus loop modifications would depend on the door configuration for the BRT vehicles. The bus loop would be designed to support counterclockwise movement for BRT vehicles with doors on the right side, while a design that supports clockwise flow would be used for left-door BRT vehicles.

The West Falls Church Station would be modified to include a transfer area that would allow BRT passengers to transfer between BRT and Metrorail without having to pass through additional faregates. Passengers entering West Falls Church Station from the Kiss & Ride and park-and-ride facilities south of the station or from regular feeder buses using the north loop would continue to pass through faregates.

The BRT Alternative would also include a new layover facility on the north side of the West Falls Church Station. A layover facility is a place for BRT vehicles to wait for the next scheduled run, and for operators to take breaks. This facility includes BRT vehicle parking spaces and operator welfare facilities (e.g., locker rooms and restrooms).

##### Tysons Corner

BRT service would be provided through Tysons Corner via the Dulles Connector Road and the DAAR. BRT vehicles would operate in regular traffic lanes, except in the eastbound direction on the Connector Road, where they would be permitted to use the shoulder during periods of severe congestion, when such use does not present a safety hazard to general-purpose traffic. This would be no different than bus operations on the

shoulder today. BRT vehicles would travel along the DAAR through Tysons Corner, providing service via either a BRT station or stop near the Spring Hill Road interchange. The provision of either a station or a stop would vary for the three alignment options.

**Alignment BRT 1.** For this option, BRT vehicles would provide service via a station located in the median of the DAAR near the Spring Hill Road interchange. The station platform would be 260 feet in length, plus space for vertical circulation. An entrance pavilion for the Spring Hill Road Station would be constructed in the existing Tysons-West*Park Transit Station on the south side of the DAAR. Passengers bound for Tysons Corner would then transfer to shuttle buses to reach their destinations. The Tysons-West*Park Transit Station currently includes bus bays and Kiss & Ride spaces. The station would have stairs and elevators for vertical circulation.

**Alignment BRT 2.** This alignment option would include a BRT stop at the Tysons-West*Park Transit Station, rather than a median BRT station. The Tysons-West*Park Transit Station would be reconfigured to include a fare pavilion and bus bays to accommodate BRT vehicles. To provide service to the stop, BRT vehicles would exit the DAAR at Route 7, and then operate in regular traffic on Tyco and Spring Hill Roads.

**Alignment BRT 3.** This alignment would use the same BRT stop configuration and access route described for BRT 2.

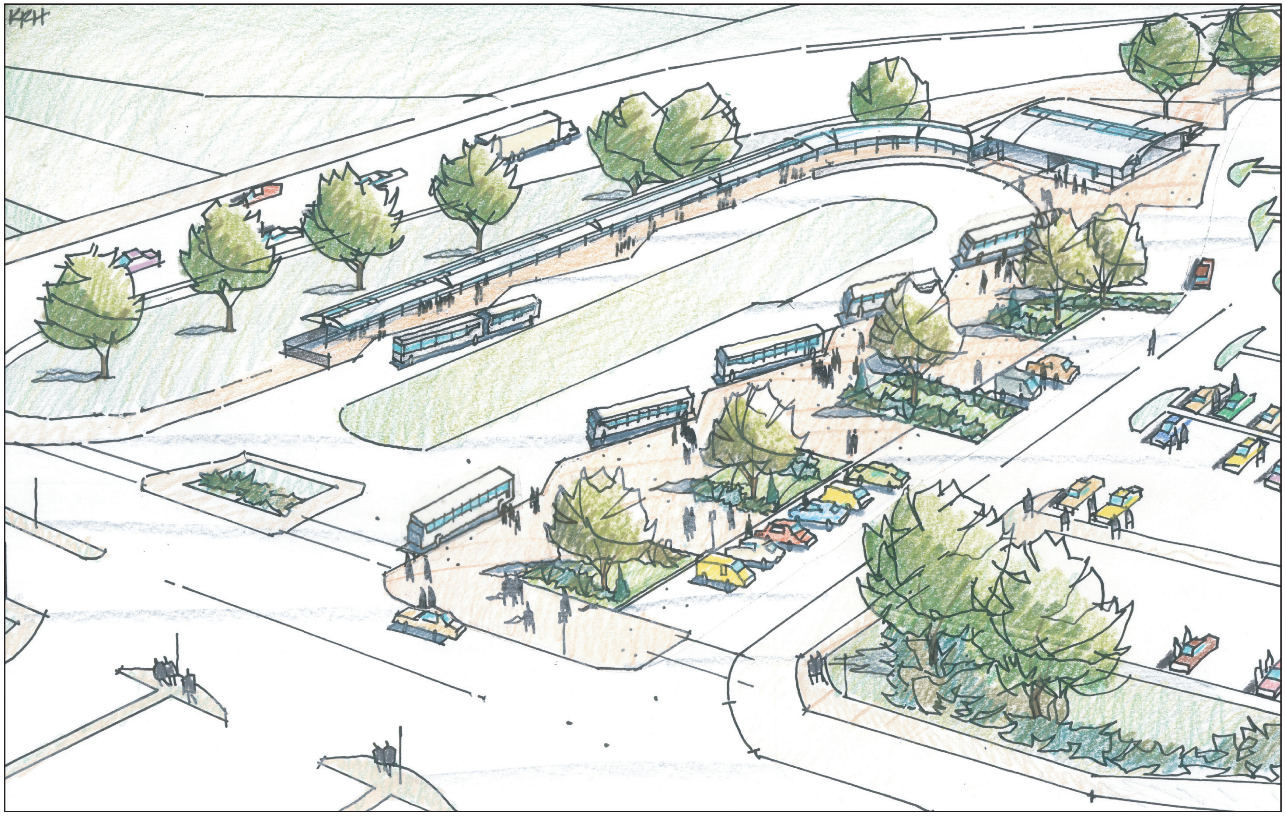
### Mid-Corridor

In the Mid-Corridor section, BRT would generally use the DAAR travel lanes. Some of the route patterns for the three BRT alignment options would require that BRT vehicles use the Dulles Toll Road HOV lanes in certain locations between Route 7 and Route 28. The combination of stations and stops in the Mid-Corridor section will vary by alignment option.

**Alignment BRT 1.** This alignment option would have at-grade median stations at Wiehle Avenue, Reston Parkway, Herndon-Monroe, and Route 28. BRT vehicles would access the stations via acceleration and deceleration lanes from the DAAR, and passengers would access the stations via pedestrian bridges connecting to station facilities on the north and south sides of the Dulles Toll Road.

Unlike the Spring Hill Road Station described earlier, the BRT stations in the DAAR median are designed to facilitate conversion to rail stations in the future. Therefore, the median BRT stations would have the standard 600-foot rail platform length, though only about 260 feet of the station would be used for passenger boarding under the BRT Alternative. The BRT stations would be able to accommodate four BRT vehicles in each direction. For express service, BRT vehicles would be able to bypass stations, but would not be able to pass one another at the stations.

The Wiehle Avenue Station would be located approximately 500 feet west of the Wiehle Avenue overpass, where the Dulles Toll Road was previously realigned to accommodate a transit station in the median of the DAAR. On the north side of the Toll Road, the pedestrian bridges would connect to station facilities at the existing Reston East Park-and-Ride, which include bus bays, Kiss & Ride spaces, and surface commuter parking spaces. This park-and-ride facility would be expanded as part of a joint development project that would include a multi-level parking garage with 2,300 commuter parking spaces. The cost of the parking facilities within this improvement is assumed as part of the Dulles Corridor Rapid Transit Project because the facility would be constructed by 2005 rather than 2010, as planned by Fairfax County. Station facilities on the




The typical BRT Stop is a "U" shaped facility featuring BRT loading/alighting bays on the left, a fare pavilion at the center, and feeder bus bays on the right. A park-and-ride lot, as shown in this figure, would be adjacent to the BRT loading/alighting areas.

Figure 2.3-4

## Typical BRT Stop

Dulles Corridor
Rapid Transit Project

south side of the Toll Road would include an entrance pavilion and a paved walkway extending from the pavilion to Wiehle Avenue.

The Reston Parkway Station would be located where the Toll Road was previously realigned to accommodate a transit station, approximately 1,000 feet west of the Reston Parkway overpass. The station would include access facilities on both the north and south sides of the Toll Road with feeder bus bays and Kiss & Ride spaces. No park-and-ride spaces would be provided at the Reston Parkway Station.

The Herndon-Monroe Station would be located east of the Monroe Street overpass. The project would provide a pedestrian walkway between Herndon Parkway and the north entrance pavilion. On the south side, the entrance pavilion would be located at the existing Herndon-Monroe Park-and-Ride. This facility includes feeder bus bays, Kiss & Ride spaces, and a parking garage with 1,750 park-and-ride spaces. The garage would be expanded to approximately 3,300 spaces by 2010, or when ridership warrants, as part of the project.

The Route 28 Station would be located east of the Route 28 interchange, north of the proposed Dulles Station development along Fox Mill Road. Fairfax County has proposed an overpass at a location just west of the station site. The location of this future overpass has been coordinated with Fairfax County to accommodate the entrance pavilion for the station. Approximately 2,400 feet of the DAAR would be realigned as part of station construction (on both the north and the south sides of the road). Station facilities on the north side of the Toll Road would include feeder bus bays and Kiss & Ride facilities. The facilities on the south side would cover a larger area and would include bus bays, Kiss & Ride spaces, and structured parking. Initially, 300 park-and-ride spaces would be provided for BRT users. Parking capacity would be expanded to approximately 2,300 spaces by 2025.

**Alignment BRT 2.** For this alignment option, the Mid-Corridor section would only include BRT stations at Wiehle Avenue, Reston Parkway, and Herndon-Monroe. No station or stop would be included at Route 28.

The locations of station facilities for the three BRT stations would be the same as those described for BRT 1; however, the configuration of the station platforms would be slightly different. The median stations for BRT 2 would have 265-foot platforms rather than 600-foot platforms, and would have fewer vertical circulation elements (elevators, escalators, and stairs). The shorter stations could still be converted to rail stations in the future, although the conversion would be more complex than for BRT 1.

**Alignment BRT 3.** This alignment option would include a single, bi-level median station at Reston Parkway and BRT stops at Wiehle Avenue and Herndon-Monroe. No station or stop would be provided at Route 28.

The Wiehle Avenue Stop would be located at the existing Reston East Park-and-Ride. BRT service associated with this stop would operate on the DAAR and the Toll Road HOV lanes. The existing park-and-ride facility would be reconfigured to include a 2,300-space parking structure with BRT vehicle bays and a fare pavilion. There are joint development opportunities at this site, however the cost of the parking improvement is assumed as part of the Dulles Corridor Rapid Transit Project.

The Herndon-Monroe Stop would be located at the existing Herndon-Monroe Park-and-Ride, and would be served by BRT vehicles operating on the DAAR and the Toll Road HOV lanes. Some service patterns would make use of the existing ramp between the park-and-ride and the Dulles Toll Road. Initially, the park-and-ride would be reconfigured to include BRT vehicle bays and a fare pavilion, but parking capacity would remain at 1,750 spaces. By 2025, the capacity would be expanded to approximately 3,300 spaces.

The bi-level station at Reston Parkway would be located in the median of the DAAR at the same location as the Reston Parkway station proposed for BRT 1 and BRT 2. However, for BRT 3, the Reston Parkway Station would be configured to accommodate future conversion to rail without affecting BRT operations. Accordingly, the station would be a multi-level structure with a BRT platform located at grade, a Metrorail platform located above the BRT platform, and a mezzanine level and pedestrian bridges located above the Metrorail platform. The bridges would be higher than those for the other alternatives at Reston Parkway and for other median stations. The entrance pavilions for the pedestrian bridges would be in the same approximate locations as those for BRT 1 and BRT 2, but would be slightly larger due to the increased height of the bridges, and the longer stairs and escalators needed to reach the higher bridges.

Initial construction of the bi-level station would include the BRT and Metrorail platforms, as well as the mezzanine level and pedestrian bridges. Construction would also include the structural support elements for the associated Metrorail alignment, which would transition to an aerial structure east of Reston Parkway. The elevated section of the rail alignment would extend 3,500 feet, passing through the station and then returning to an at-grade configuration. All station and structural support elements would be constructed prior to implementation of BRT operations so that future conversion to Metrorail would not affect BRT operations.

### Dulles Airport

For the BRT Alternative, BRT vehicles would provide service to Dulles Airport following the existing airport roadways. In the westbound direction, BRT vehicles would travel along the DAAR, then follow the airport roads to the BRT stop at the east end of the terminal. After the stop, BRT vehicles would continue along airport roads, and depending on the service pattern, would either return to the DAAR in the eastbound direction or head north and west to the Dulles Greenway.

The BRT stop would be located along the ground transportation roadway at the curb adjacent to the terminal, in front of the ground transportation center, and would have space for up to three BRT bays. Fare collection equipment would be located in the existing ground transportation center, inside the terminal.

### Loudoun County

The Loudoun County alignment extends westward along the Dulles Greenway from the Dulles Airport property to the Route 606 interchange and ends just west of the Route 772 interchange, the western terminus of the project. BRT vehicles would travel in the regular traffic lanes on the Greenway. At the Route 606 and Route 772 stops, buses would leave the Greenway using existing highway ramps to access the stop facilities. The three BRT alignments would be identical for this section of the BRT Alternative.

The Route 606 Stop would be located at the Dulles North Transit Center on the north side of the Greenway near Route 606. The transit center includes bus bays, Kiss & Ride spaces, and 750 surface parking spaces. A fare pavilion and canopies would be added to the transit center to support BRT service. Existing bus bays would be modified to accommodate BRT vehicles. When demand grows to warrant additional parking spaces, the stop would be relocated to the proposed site for the Metrorail station facilities, just west of the Dulles North Transit Center, and would be expanded to include a 2,000-space parking garage. Ultimately, this garage could be expanded to approximately 4,200 parking spaces.

The Route 772 Stop would be located on either the north or south side of the Greenway. New roads, to be built by Loudoun County or the site's developer, would provide access to the stop. Two sites are being carried forward for further evaluation because the site north of the Greenway (the originally proposed site) could have

wetland and stream impacts. Both locations for the stop would include a fare pavilion, a BRT bus loop, a feeder bus loop, and Kiss & Ride spaces. Neither site would include park-and-ride facilities.

#### BRT Maintenance and Storage Facility

The BRT maintenance and storage facility would be located at Site 14. This site is located on the northern portion of the Dulles Airport property, north of the Dulles Greenway and south of Route 606, almost directly opposite the Dulles North Transit Center (see Figure 2.3-5). The proposed site, which was selected in close coordination with MWAA, is approximately 26 acres in size, and its western edge is located in the runway approach surface for Dulles Airport Runway 19R.

The proposed maintenance and storage facility would be used for BRT vehicle maintenance, and would have exterior storage capacity for approximately 75 buses. The site would have two buildings with an aggregate floor area of approximately 200,000 square feet. Buildings would be arranged to remain clear of the runway approach surface, as MWAA policy is to not allow building construction within this zone. Vehicles would access the maintenance and storage facility via the Dulles Greenway and Route 606. A new access road would be developed between Route 606 and the yard site. Two options for the access road are under consideration as shown in Figure 2.3-5.

### 2.3.1.4 Operations

The BRT Alternative would include operating plans for (1) BRT vehicles providing service in the corridor, and (2) the feeder and corridor bus network, which includes routes feeding into BRT stations or stops within the corridor, as well as regional routes running the full length of the corridor. Service patterns would differ for each BRT alignment option.

#### BRT Operations

For all three BRT alignment options, service would consist of several different route and stop patterns with varying headways. These patterns have been designed to serve potential BRT markets and to correspond to the combination of stations and stops used for each alignment option. When demand at some stations for certain routes exceeds the capacity that can be provided by one BRT vehicle, these routes would be operated using two-vehicle platoons. These two-vehicle platoons can be thought of as bus trains, where the two vehicles run in tandem, though not physically connected like rail cars.

For each alignment option, one set of route patterns has been developed for peak-hour service and another for off-peak times. The peak-period service patterns are depicted in Figure 2.3-6. The figure presents routes, stops, headways, and the number of buses serving each station and stop in a peak hour (if total bus volumes result in 0.5, then the headways are not divisible by a 60-minute hour).

With these service patterns, each alignment option would have 80 BRT vehicles traveling during the peak hour to the West Falls Church Station by 2025. This level of service requires that BRT vehicles move efficiently through the median stations associated with BRT 1 and BRT 2.

The service patterns presented in this section are expected to meet the projected demand for a stand-alone BRT alternative in 2025. A BRT plan has also been developed to meet forecast demand in 2005/06, the proposed opening year of BRT.

### Feeder and Corridor Bus Network

The feeder and corridor bus network for the BRT Alternative is a complex system of routes that would be run by three different operators: WMATA, Fairfax County, and Loudoun County. The routes operated by each provider are shown in Figure 2.2-1 in Section 2.2.1 for the Baseline Alternative.

The existing network would be modified for the BRT Alternative. Several routes would be realigned to provide better service to the proposed BRT stations and stops in the corridor, and numerous routes would be eliminated and replaced by the modified routes or the enhanced BRT service. The service frequencies would be modified for other routes to be more consistent with the new transit service in the corridor and to reduce duplication of service.

These changes are identified in Chapter 6 and described in detail in the *Transit Operations and Maintenance Plan* (June 2002). In the report, the bus network for the Baseline Alternative is described, including service route names, operator, type of service, days of operation, routing and terminal points, and service frequencies during the peak and off-peak-periods. For each route, the changes proposed for the BRT Alternative are outlined.

## 2.3.2 METRORAIL ALTERNATIVE

As shown in Figure 2.3-7, the Metrorail Alternative generally follows an alignment between the Metrorail Orange Line near West Falls Church Station and Route 772 in Loudoun County, using the median of the Dulles Connector Road, the DAAR, and the Dulles Greenway. The alignment diverges from these routes to serve Tysons Corner and Dulles Airport. There are four possible configurations for providing Metrorail service in Tysons Corner (Alignments T1, T6, T9, and T4), which include a combination of aerial and underground segments.

The Metrorail Alternative would include up to 13 new stations, as well as ancillary facilities, such as a Metrorail Service and Inspection (S&I) Yard, traction power substations, and tie-breaker stations. The alternative is expected to begin operation in 2010.

### 2.3.2.1 Rail Technology Characteristics

Metrorail is the Washington metropolitan region's rapid rail system. Rapid rail, or heavy rail, is typically described as a high-speed, high-volume passenger rail technology that operates in multiple-car trains on fixed rails in separated rights-of-way. The rights-of-way for rapid rail systems are completely separated from other vehicles and foot traffic because rapid rail trains draw their power from a high-voltage, electrified third rail.

Rapid rail systems typically feature fixed stations with advanced fare collection and multi-door boarding from level platforms.

The railcars for the Metrorail system (see Figure 2.3-8) are 75 feet long and 10 feet wide. Seating per car averages 73 spaces, with specific seating areas designated for riders with disabilities. A single car has three sets of doors on each side. An operator's cab sits at the end of each car where the control console is located. Communication equipment for the train and for central control is also located in the cab. The cars are powered by 750-volt direct current from a third rail.

### 2.3.2.2 Rail Station Characteristics

In the Dulles Corridor, Metrorail stations would generally have a single center-platform configuration, although some alternatives in Tysons Corner would use one or two side platforms. The standard center platform is 600

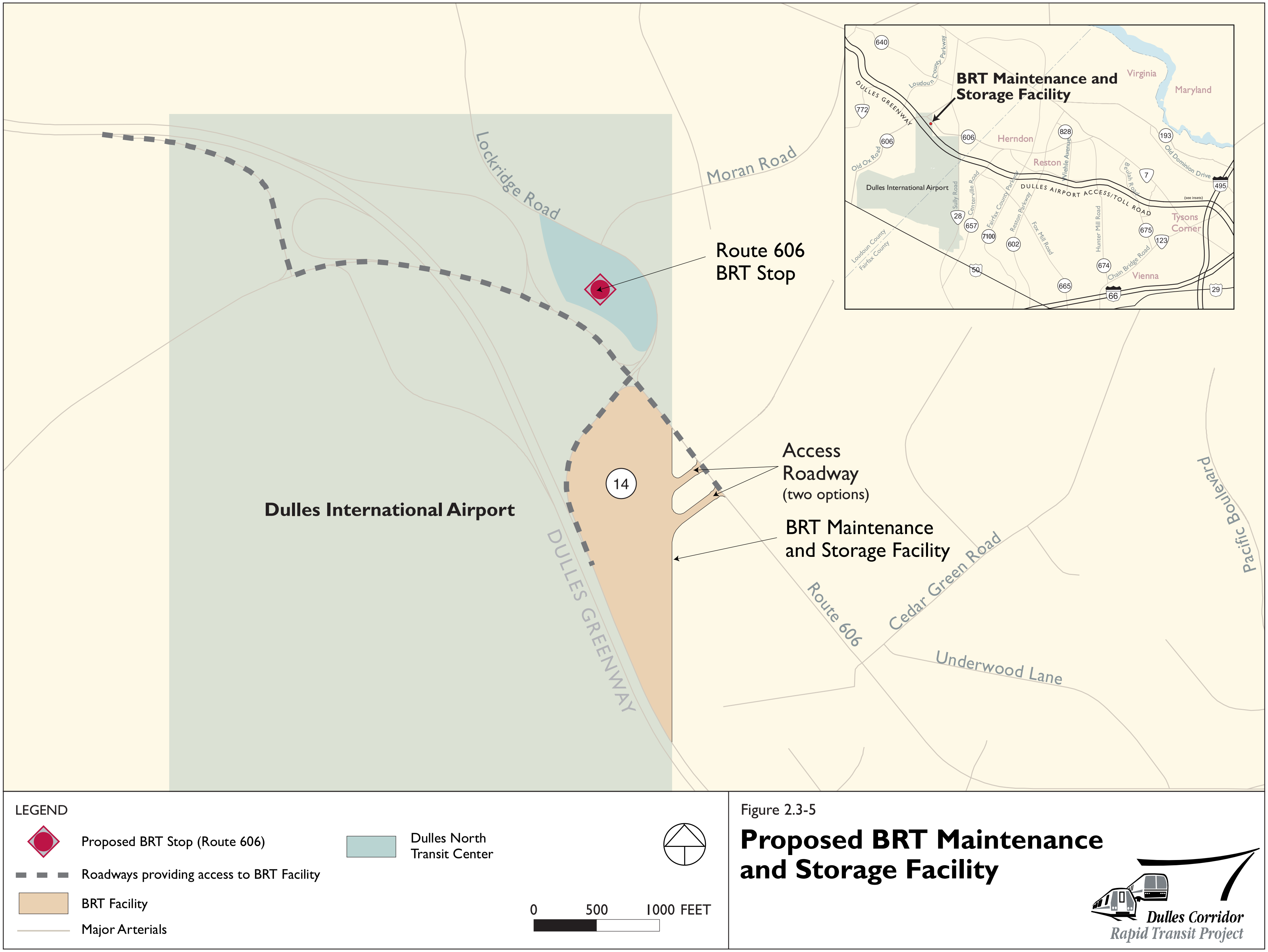
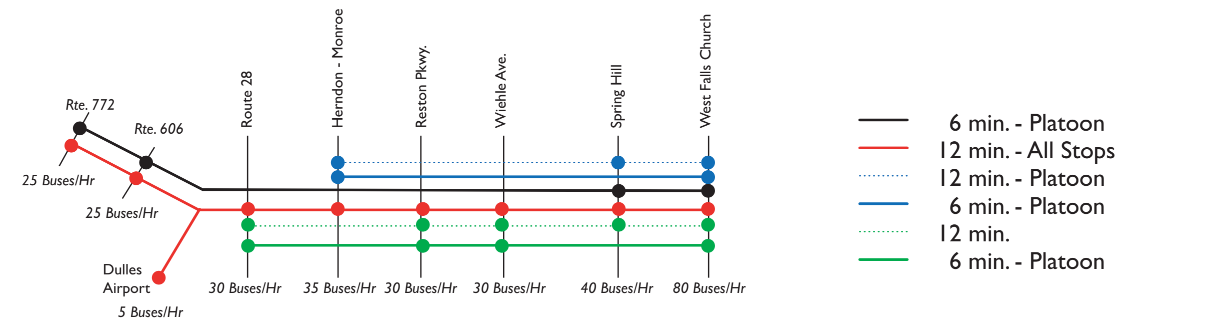


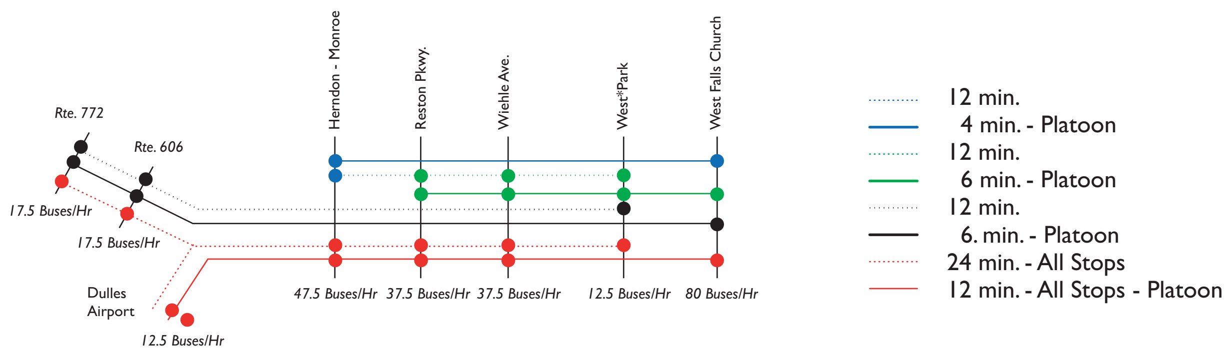

Figure 2.3-5

## Proposed BRT Maintenance and Storage Facility

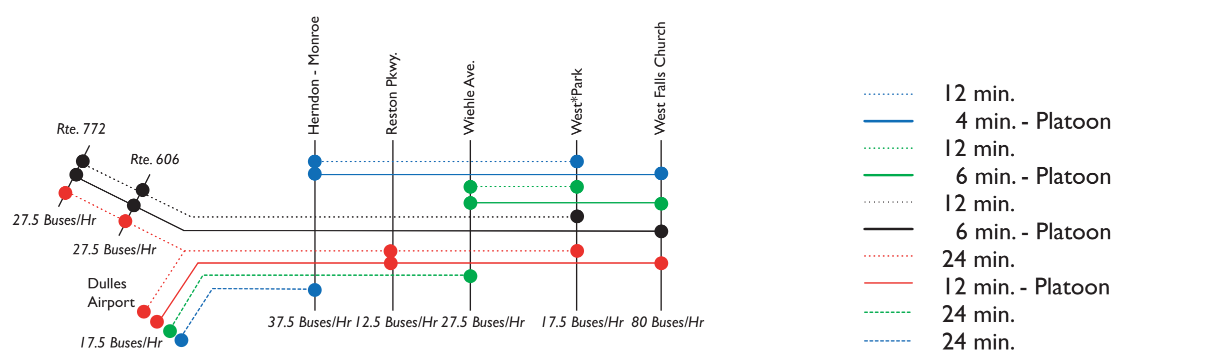
**Alignment BRT 1 - Full**
All Trips to WFC




**Alignment BRT 2 - Basic**
Split Service to Tysons-West*Park/WFC




**Alignment BRT 3 - Direct**
Split Service to West*Park/WFC



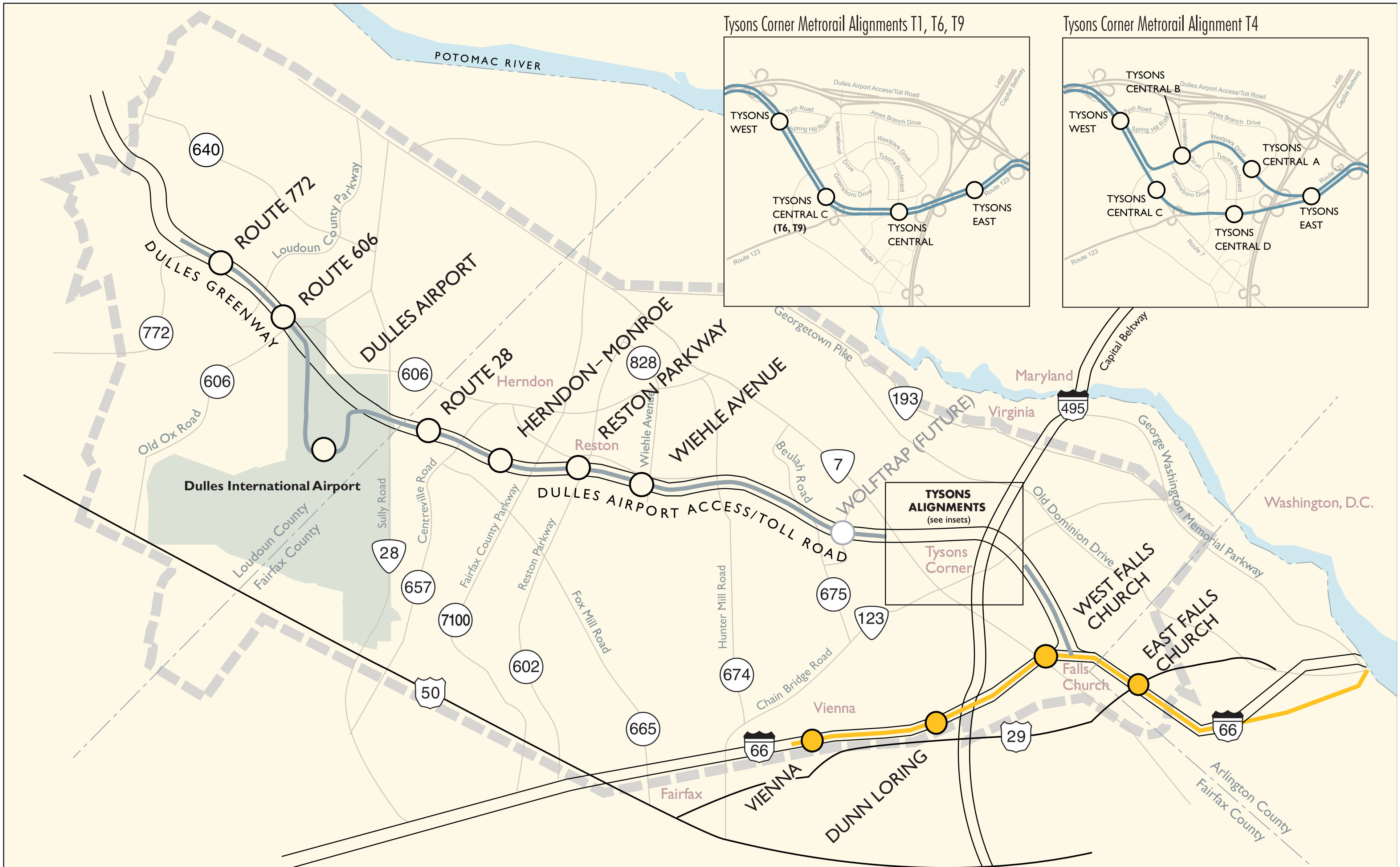

LEGEND

Note: A Platoon is two buses running in tandem

Figure 2.3-6

**BRT Peak Period Operating Plans**

Dulles Corridor Rapid Transit Project




LEGEND

- Existing Metrorail Orange Line and Stations
- Metrorail
- Limited Access Highway
- U.S. Highways
- Major Arterials
- Proposed Transit Station
- Future Station
- Dulles Corridor Boundary

0 1 2 3 MILES

Figure 2.3-7

# Metrorail Alternative

Dulles Corridor Rapid Transit Project


Figure 2.3-8

**Metrorail Vehicle**

Dulles Corridor
Rapid Transit Project

feet long and 30 feet wide with track on both sides, and can accommodate trains up to eight cars long in each direction (see Volume IV). Rail stations would include a mezzanine level with fare collection equipment, elevators and escalators for vertical circulation, and service room space at both ends of the station. Rail stations would be located at or near grade in the DAAR, the Dulles Connector Road, and Dulles Greenway medians; underground at Dulles Airport; and underground or on aerial structure in Tysons Corner Rail stations would have the same type of pedestrian access and station facilities as the BRT stations. Entrance pavilions connected to pedestrian bridges that cross highways and busy arterials would provide access to median and aerial stations. Entrance pavilions would vary in size depending on the height differential between the bridge and the ground. Some entrance pavilions may only have elevators and stairs, while others would have elevators, stairs, and escalators. Most station facilities would include bus bays for feeder buses, Kiss & Ride spaces, provisions for taxi access, bicycle racks, and lockers. Some stations would also have park-and-ride facilities for commuters, including accessible spaces for disabled persons.

#### 2.3.2.3 Metrorail Alignments and Stations

**Orange Line Connection**

The Metrorail Alternative connects to the Orange Line between the West Falls Church and East Falls Church stations. The Dulles Corridor tracks would diverge from the Orange Line tracks on flyover structures, turning north and first passing over the westbound lanes of I-66, then over the outbound bus ramp between the West Falls Church Station and the Connector Road. The tracks would continue on aerial structure to the median of the Connector Road, returning to grade just south of Idylwood Road.

This configuration would allow the Dulles Corridor line to provide service to the East Falls Church Station and other points east on the Orange Line. Service to West Falls Church Station and points west on the Orange Line would require a transfer at East Falls Church Station. While demand does not currently warrant a direct connection to the western end of the Orange Line, the alignment has been designed to accommodate such a connection in the future. There would be no new stations for this section of the Metrorail Alternative.

The Metrorail Alternative would also include a new yard lead into the West Falls Church S&I Yard. The yard lead would connect to the loop track on the north side of the yard, extending eastward and passing under the eastbound travel lanes of the Dulles Connector Road before surfacing in the median of the Dulles Connector Road. Here, the lead would be located between the inbound and outbound revenue service tracks.

**Tysons Corner**

Through Tysons Corner, the Metrorail Alternative would use one of four alignments: T1, T6, T9, or T4 (see Figure 2.3-9). At the eastern and western edges of Tysons Corner, the four alignments would be similar except that Alignments T1 and T6 would have center-platform stations (the tracks would diverge or widen in the station vicinity to accommodate a platform in the center), and Alignments T4 and T9 would have side-platform stations (the tracks would not widen and platforms would be located outside the tracks). In the core of Tysons Corner, Alignments T1 and T6 would have center-platform stations with wide track centers in the station vicinity, whereas Alignment T9 would have side-platform stations with narrow track centers. Alignment T4 would have a one-way, single-track, side-platform configuration.

For all four alignments, the Metrorail line would diverge from the Dulles Connector Road at the Route 123 interchange. The at-grade tracks on the Connector Road would transition to an aerial structure near Chain Bridge Road and pass through the Route 123 interchange on flyover bridges.

The aerial alignment then follows Route 123 to the Capital Beltway, and includes one station. Tysons East Station would be an aerial station located in the northwest quadrant of the intersection of Scotts Crossing Road/Colshire Drive and Route 123. It would be accessible from the street level on the north side of Route 123, and from a pedestrian bridge touching down on the south side of Route 123 near Colshire Drive. The station facilities along Colshire Drive would include bus bays and Kiss & Ride spaces.

For Alignments T1, T6, and T4, the Tysons East Station would include pocket tracks on the east side of the station. Pocket tracks are located between the main tracks and are used to store out-of-service trains or equipment, and to provide trains turn-around capability for short-run service. Alignment T9 would include a double crossover on the east side of the station in lieu of pocket tracks. A double crossover would allow for single-track operations during an emergency, but would not provide storage or turn-around capabilities.

From Tysons East Station, the rail alignment would proceed west, passing over the Capital Beltway, and continue on to the core of Tysons Corner. For the four alignments, the aerial rail structure would range from 25 feet to approximately 90 feet above adjacent streets. Elevated rail stations in the core of Tysons Corner would range in height from 30 to 60 feet above ground. One potential station would be approximately 75 feet underground. Other than at the Tysons East and Tysons West stations, none of the stations would have Kiss & Ride or park-and-ride facilities, because the stations are intended to facilitate pedestrian access to and from the surrounding land uses in the core of Tysons Corner and reduce auto-dependence. Provision of parking facilities would conflict with these goals. Artist's renditions of the different types of stations in Tysons Corner are shown in Figure 2.3-10.

West of Westpark Drive, each of the four alignment options would follow a similar aerial alignment through the western portion of Tysons Corner. All alignments run along the south side of Route 7 and each alignment option would include one aerial station at the western edge of Tysons Corner (Tysons West).

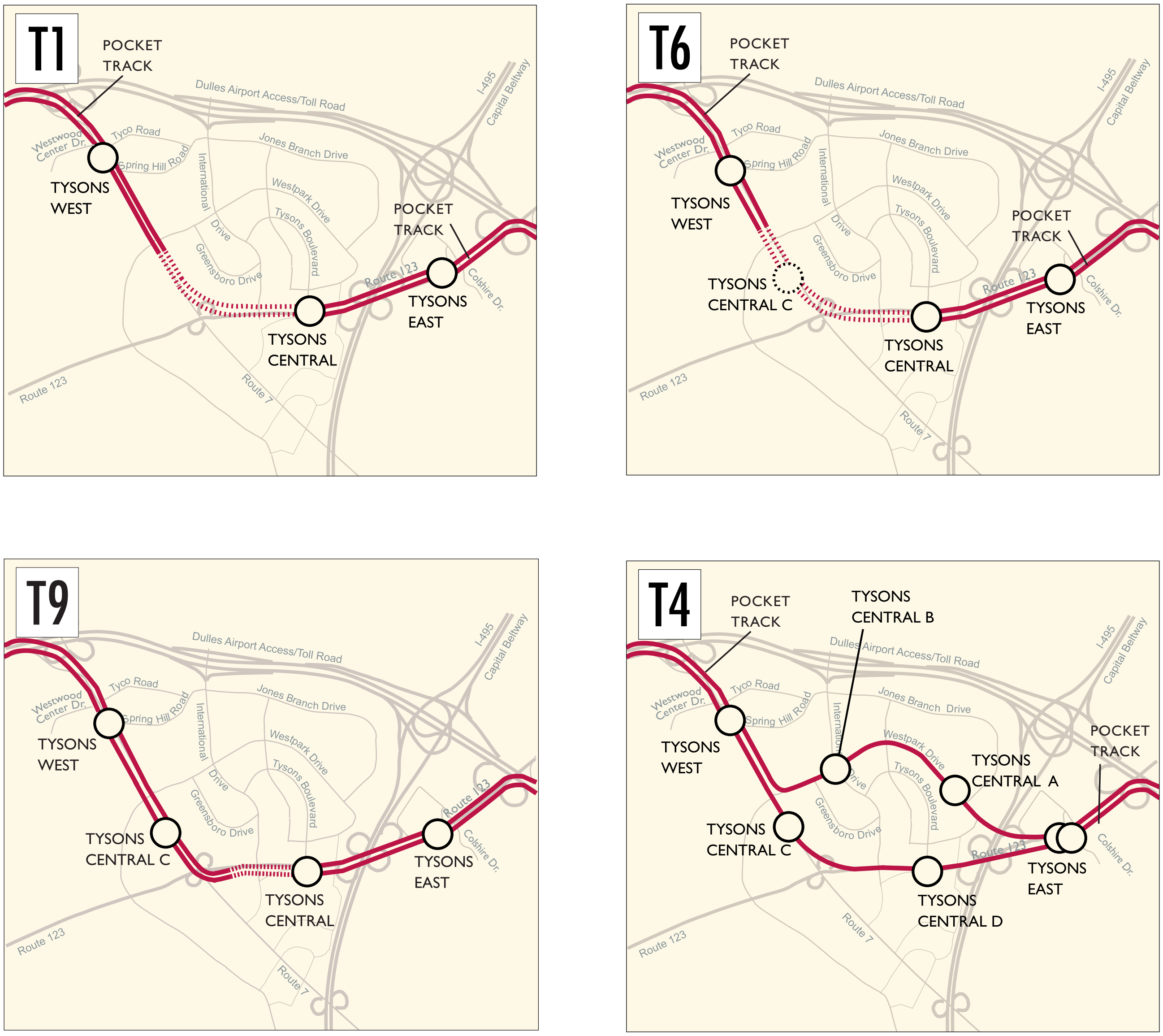
The Tysons West Station would be located on the south side of Route 7 between Westwood Center Drive and Spring Hill Road. The station would be accessible from the street level on the south side of Route 7 and from an entrance pavilion proposed on the north side of the Tyco Road/Route 7 intersection. Station facilities at this location would include bus bays, Kiss & Ride spaces, and a parking structure (with the first level reserved for use as an intermodal center). The upper levels of the garage would include approximately 2,000 park-and-ride spaces. Vehicles would access the station facilities using existing local roads.

Like the Tysons East Station, the Tysons West Station would include a pocket track for Alignments T1, T6, and T4 between the station and the Dulles Toll Road. Alignment T9, however, would include a double crossover east of the Tysons West Station.

West of the Tysons West Station, the elevated rail alignment would continue along Route 7. At the DAAR, the aerial alignment would pass over the interchange ramps and continue west on the DAAR, transitioning to grade approximately 1,600 feet west of Route 7.

Further detail on the configuration of the four alignments through the core of Tysons Corner is provided in the following sections.

**Alignment T1.** Alignment T1 extends through Tysons Corner along Routes 123 and 7. Most of the alignment would be elevated, except for an underground segment extending west from the intersection of Route 123 and Tysons Boulevard to just south of the intersection at Route 7 and Westpark Drive.




LEGEND

Proposed Station

Proposed Station Below Ground

Proposed Aerial Alignment

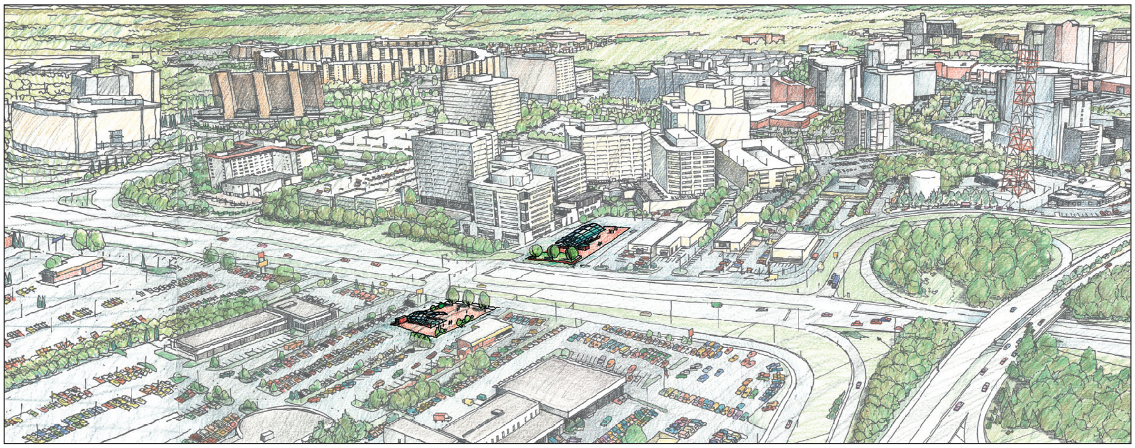
Proposed Underground Alignment

Major Arterials

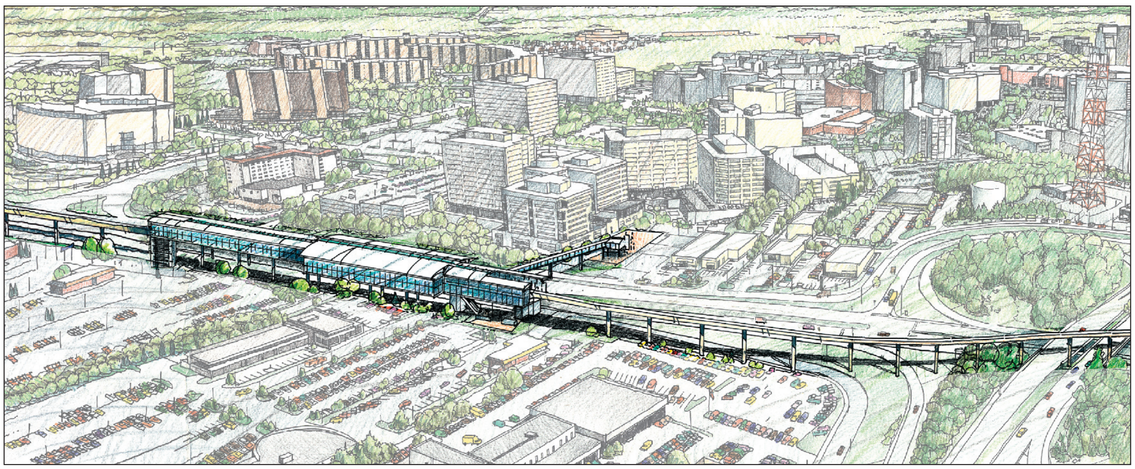
Figure 2.3-9

# Tysons Corner Metrorail Alignments

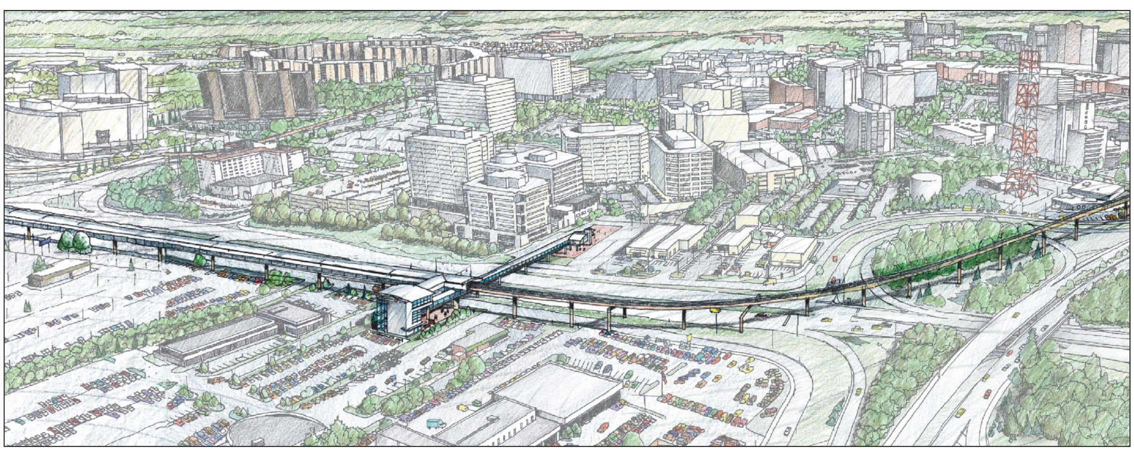
Dulles Corridor
*Rapid Transit Project*



**Underground Station in Tysons Corner - Route 7**
(Tysons Central C - Alignment T6)



**Aerial Double-Track Station in Tysons Corner - Route 7**
(Tysons Central C - T9)



**Aerial Single-Track Station in Tysons Corner - Route 7**
(Tysons Central C - T4)

Figure 2.3-10

# Typical Station Types in Tysons Corner

Dulles Corridor
Rapid Transit Project

This alignment would have one station in the central core of Tysons Corner, Tysons Central Station, which would be located along Route 123 at the intersection with Tysons Boulevard. Tysons Central Station would be partially elevated and partially on retained fill. The station would have two entrances, one in the northwest quadrant of the intersection at Tysons Boulevard and Route 123, and one at Tysons Corner Center on the south side of Route 123. A new bus loop would be constructed on the north side of the mall to provide feeder bus service to the station.

**Alignment T6.** Alignment T6 is similar to Alignment T1, except that it would have a second station in the central core of Tysons Corner, Tysons Central C. In addition, the underground portion of Alignment T6 would be slightly longer than that for Alignment T1, transitioning back to aerial structure southeast of the intersection at Route 7 and Spring Hill Road.

The Tysons Central C Station would be located underground near Pike 7 Plaza on the south side of Route 7, between the Route 7/Westpark Drive intersection and the Route 123/Route 7 interchange. The station would be approximately 75 feet below ground, with entrances on the north and south sides of Route 7. Underground walkways would provide access to the station. It would not have bus bays, Kiss & Ride spaces, or park-and-ride spaces.

**Alignment T9.** Alignment T9 follows the same general horizontal alignment as Alignments T1 and T6. Though the T9 alignment carried forward from intermediate screening was an entirely elevated version of Alignment T1 with an optional station at the Tysons Central C location, the design of Alignment T9 was refined as part of conceptual design development in support of the Draft EIS. The alignment now has a much lower vertical profile, includes a short underground segment, and runs along the south side of the Route 7/Route 123 interchange instead of the north side. As noted earlier, Alignment T9 would have side-platform stations with narrow track centers throughout. These design refinements were undertaken to enhance the alignment's constructibility and lower its vertical profile.

Though Alignment T9 would be primarily elevated, it would include a short tunnel segment extending west from the Route 123/Tysons Boulevard intersection, passing under Route 123, and surfacing on the south side of the road, just east of the Route 7/Route 123 interchange. This tunnel would be much shallower than the underground segments of Alignments T1 and T6. Upon exiting the tunnel, the alignment would transition to an aerial structure and pass over the Route 7/Route 123 interchange.

A design option under consideration for Alignment T9 would include modifications to the vertical profile and the tunnel segment. For the design option, the vertical profile between the Tysons East and Tysons Central stations would be higher than Alignment T9 and identical to that for Alignments T1 and T6; whereas for Alignment T9, this portion of the alignment would have a lower profile than Alignments T1 and T6. The tunnel segment for the design option would run along the north side of Route 123, similar to the tunnel for Alignments T1 and T6, rather than passing under Route 123. The tunnel would surface east of the Route 7/Route 123 interchange, slightly further west than that for Alignment T9. The design option tunnel would still be shallower than the tunnels for Alignments T1 and T6.

Both Alignment T9 and the design option would include a Tysons Central Station and a Tysons Central C Station. As with Alignments T1 and T6, the Tysons Central Station for Alignment T9 would be located at the intersection of Route 123 and Tysons Boulevard and would be partially elevated and partially on retained fill. However, for Alignment T9, the station would have a dual side-platform configuration rather than a center-

platform configuration. The station would include entrances on the north and south sides of Route 123, as well as a new bus loop on the north side of Tysons Corner Center.

The Tysons Central C Station for Alignment T9 would be an aerial side-platform station rather than an underground center-platform station. The station would also be located slightly east of the Tysons Central C Station for Alignment T6. Station entrances would be in the same locations, though the configurations would change slightly because pedestrian access would be provided with bridges instead of underground walkways.

**Alignment T4.** To serve the central core of Tysons Corner, Alignment T4 would diverge into two single-track legs. The south leg would run along Route 123 and Route 7, similar to Alignment T1, while the north leg would run along Westpark Drive. The alignment would be entirely elevated and would include four aerial, one-way stations, two located on the north leg (Tysons Central A and B) and two on the south leg (Tysons Central C and D). Because they would be along single-track sections, these stations would be single side-platform stations, only serving passengers traveling in one direction.

Tysons Central A Station would be located on the south side of Westpark Drive between West Branch Drive and Jones Branch Drive. It would have an entrance pavilion connecting to the western end of the station. The entrance pavilion would include only elevators and public stairs, it would not have escalators. This station would not have Kiss & Ride or park-and-ride facilities. Feeder buses would pick up and drop off station passengers along the street at regular bus stops.

Tysons Central B Station would be located on the north side of Westpark Drive, spanning International Drive. Most of the platform would be located west of International Drive. One entrance pavilion would provide passenger access to the station. This pavilion would be located along Westpark Drive, either on the east side of International Drive, or on the west side of Greensboro Drive. Feeder buses would provide station access via nearby bus stops.

The Tysons Central C and D stations would be in the same locations as the Tysons Central C and Tysons Central stations described for Alignment T9, except that they would be located along a single-track section rather than double-track. In addition, the Tysons Central D station would be much higher than the Tysons Central Station for the other alignments because Alignment T4 does not include an underground segment west of the station.

### Mid-Corridor

In the Mid-Corridor section, the Metrorail alignment would be located at-grade in the median of the DAAR and have median stations at Wiehle Avenue, Reston Parkway, Herndon-Monroe, and Route 28. There would be small areas of cut and fill along the alignment, predominantly in the vicinity of stations, to allow for level platforms. A representative median station is shown in Figure 2.3-11.

This section of the rail alignment would include provisions to accommodate a future station at Wolf Trap Farm Park for the Performing Arts (Wolf Trap). A future station at Wolf Trap would be located in the median of the DAAR in the vicinity of Trap Road. The Wolf Trap Station has been proposed as a special-use station serving Wolf Trap events and other park uses. To minimize the cost of construction and disruptions to transit operations should a station be built in the future, the initial design and construction of the Dulles Corridor Rapid Transit Project would incorporate some provisions for the future site, including a 1,700-foot-long section of retained fill to support the tracks.

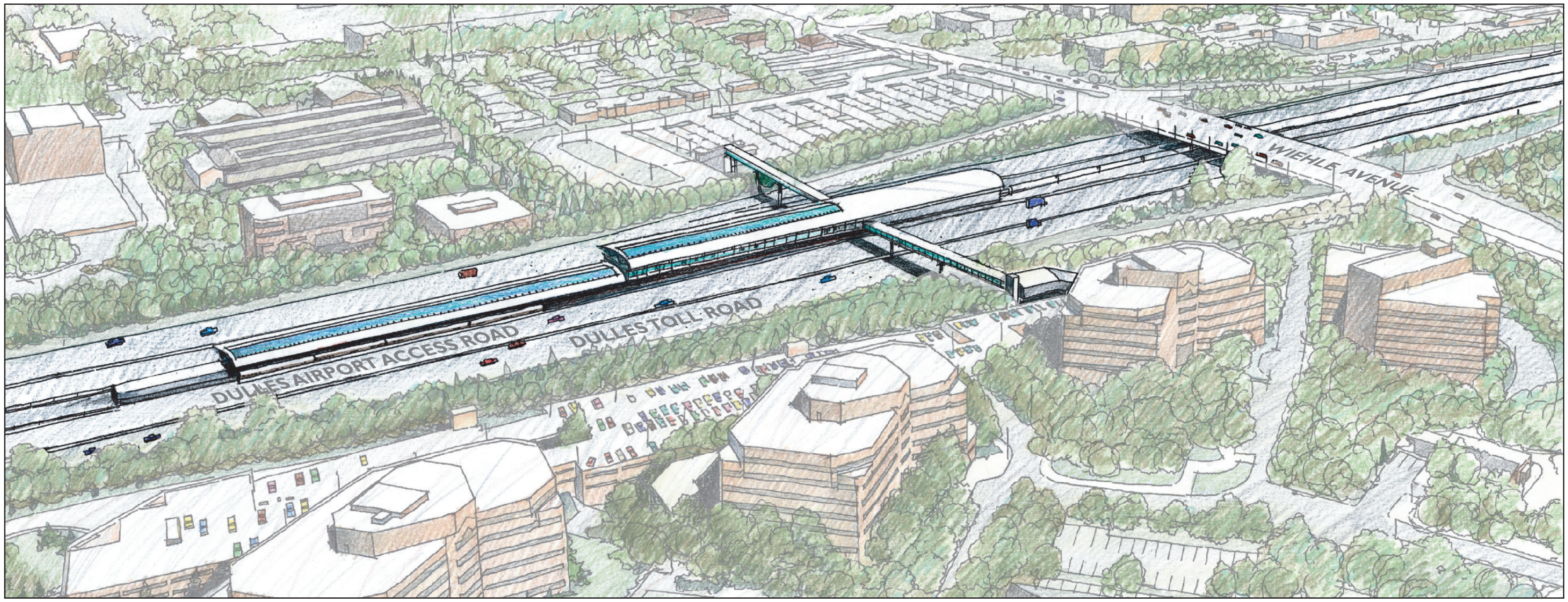



Figure 2.3-11

**Typical Rail Station in Median of Dulles Airport Access Road - Wiehle Avenue**

Dulles Corridor
Rapid Transit Project

The locations of the other four median stations, pedestrian access to the stations, and station facilities would be identical to those associated with Alignment BRT 1. As was the case for the BRT 1 alignment, portions of the DAAR would need to be realigned at the Herndon-Monroe and Route 28 median station areas. Upon future construction of the third lane of the DAAR, portions of the Dulles Toll Road would need to be realigned at these stations.

In addition, the Mid-Corridor section of the rail alignment would include a pocket track west of the Wiehle Avenue Station and a maintenance track east of the Herndon-Monroe Station. Both facilities would require that portions of the DAAR be realigned.

### Dulles Airport

The Metrorail alignment at Dulles Airport would go underground in the median of the DAAR west of the Route 28 overpass. The underground alignment would turn south toward the terminal, then turn west to access an underground station located immediately in front of the terminal. The alignment would extend under the parking lot north of the terminal building, then turn north and rise to the surface, transitioning to an aerial structure between Aviation Drive and Package Court. The elevated tracks would follow Autopilot Drive, heading toward the northwest corner of Dulles Airport property and the Dulles Greenway in the vicinity of Route 606.

The underground station at the airport terminal has been designed to not preclude a station for a planned airport landside people-mover. The people-mover is planned by MWAA as a separate project after construction of the Dulles Corridor Rapid Transit Project. The Metrorail station would be located under the existing surface parking lot, adjacent to the future people-mover station (see Figure 2.3-12). Access to the Metrorail station mezzanine would be provided via pedestrian tunnels extending from the center of the existing terminal. MWAA is currently constructing these tunnels to provide pedestrian access to the parking garage in front of the airport terminal.

### Loudoun County

The Metrorail alignment in Loudoun County would extend along the Dulles Greenway to a point near the Route 772 interchange. The Metrorail alignment would include a tail track that extends beyond Route 772 for storage of trains.

The rail alignment would transition to grade in the median of the Greenway just east of the Route 606 overpass. The at-grade tracks extend westward, crossing Broad Run on an elevated structure parallel to the existing Greenway bridge. The tracks would continue westward to the west side of the Route 772 overpass. Approximately 1,800 feet of the rail alignment are available for storage of vehicles outbound of the Route 772 Station.

Along the Greenway, the Metrorail Alternative would have rail stations located in the median, with pedestrian bridges connecting to station facilities. The Route 606 Station would be located just west of the Route 606 overpass and the Dulles North Transit Center. The at-grade station would connect to new station facilities on the north side of the Greenway, including bus bays, Kiss & Ride spaces, and a garage with approximately 4,000 park-and-ride spaces. Given the proximity of the Dulles North Transit Center, parking at that facility could provide overflow spaces for the Metrorail station.

The Route 772 Station would be located one-half mile east of the Route 772 overpass, and would connect to station facilities on the north or south side of the Greenway. These facilities are in the same location as those

proposed for the BRT stop; however, an entrance pavilion would be provided for access to the Metrorail station.

Like several of the stations in the DAAR median, the Loudoun County rail stations would require realigning portions of the Dulles Greenway to accommodate transit stations in the median.

### Metrorail S&I Yard

Three sites are under consideration for the Metrorail S&I Yard: Site 7, Site 15, and Site 20 (see Figure 2.3-13).

- Site 7 is located on the north side of the Dulles Greenway between Broad Run and the Loudoun County Parkway.
- Site 15 is located south of Route 606, west of Horsepen Lake. The site is on Dulles Airport property, north of future runway 1L/19R. Approximately half of the site is in the runway approach surface. To be consistent with MWAA policies regarding construction in the runway approach surface, occupied buildings on Site 15 would be located outside the approach surface.
- Site 20 is located in Loudoun County, west of the airport, between Broad Run and Route 606.

The S&I Yard, which would occupy roughly 70 to 90 acres, would be used for storage, maintenance, inspections, and repairs of Metrorail vehicles. It would have several buildings, including an operations and field base building, a service and inspection shop, and a car wash. The yard would also include a traction power substation, a tie-breaker station, stormwater management facilities, and storage areas for materials.

The rail yard would initially be constructed to store, inspect, and service 184 rail vehicles. The design would allow for future expansion to accommodate potential growth of the Dulles line.

Metrorail vehicles would access the proposed yard sites via lead tracks from the Metrorail alignment. For Site 7, yard leads would be located east of the Loudoun County Parkway, running north into the yard. Because of the proximity of Site 7 to the Dulles Greenway, the leads would be relatively short; Sites 15 and 20 would require longer leads. For Site 15, the leads would diverge from the alignment just east of the Route 606 interchange, and then extend west to the yard, crossing Horsepen Run. The leads for Site 20 would diverge from the alignment in approximately the same location as those for Site 7, running southwest along Broad Run and also crossing it.

As part of the Metrorail Alternative, it is assumed four storage tracks would be added to the northeast side of the West Falls Church S&I Yard. These storage tracks would have the capacity to store an additional 26 rail cars, and are expected to help facilitate Metrorail operations in the Dulles Corridor.

### Other Ancillary Facilities

The Metrorail Alternative would require three additional types of ancillary facilities: traction power substations, tie-breaker stations, and stormwater management facilities.

Traction power substations are facilities that supply direct current power for the rail system. The power company supplies electricity as high voltage alternating current, which the traction power substations reduce and convert to direct current and feed to the contact rail that powers the rail vehicles. A standard traction power substation is about 90 feet by 90 feet and is approximately one story high, but the buildings vary in size and type.

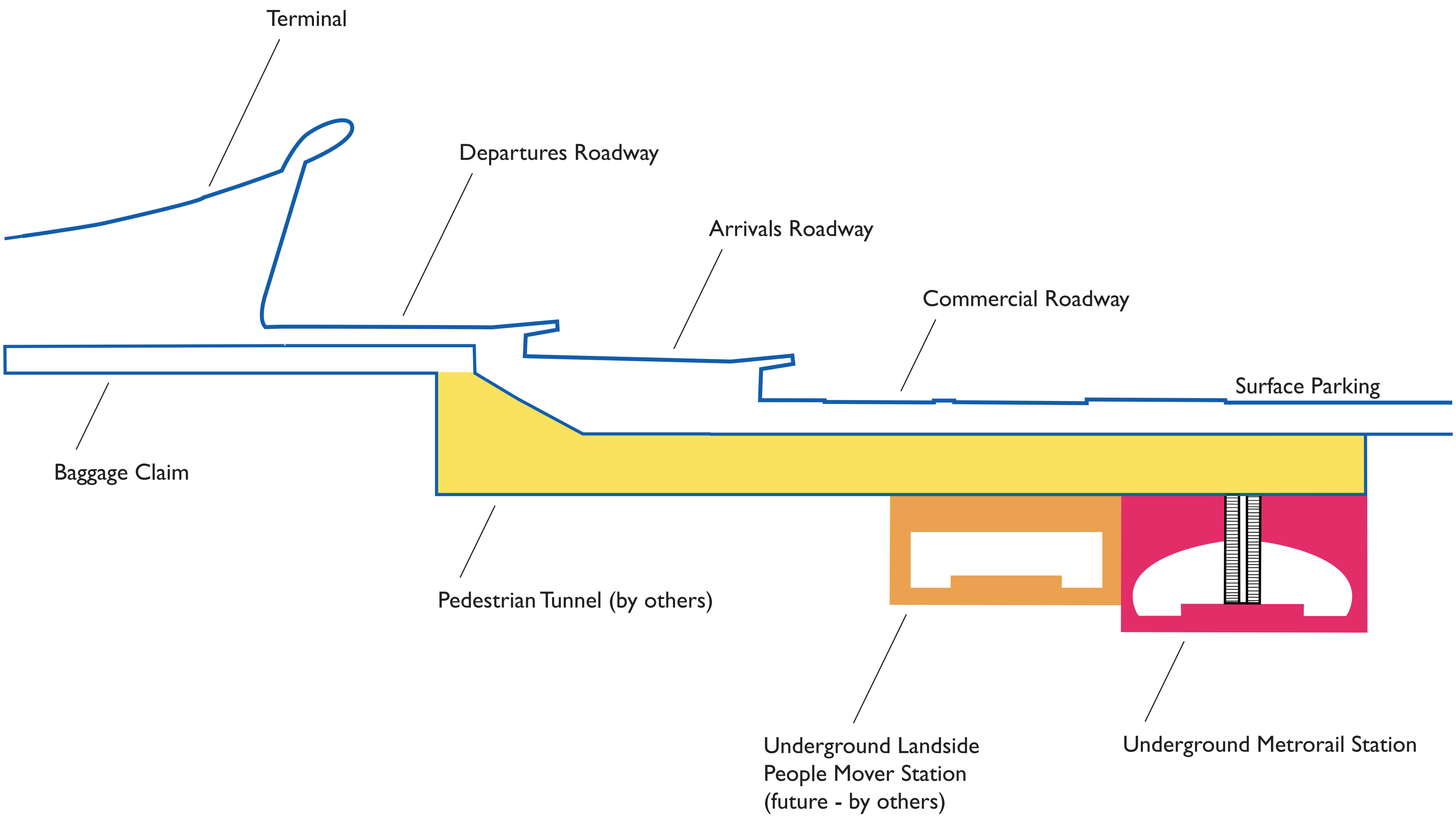



Figure 2.3-12

**Dulles Airport Metrorail Station**

Dulles Corridor
Rapid Transit Project

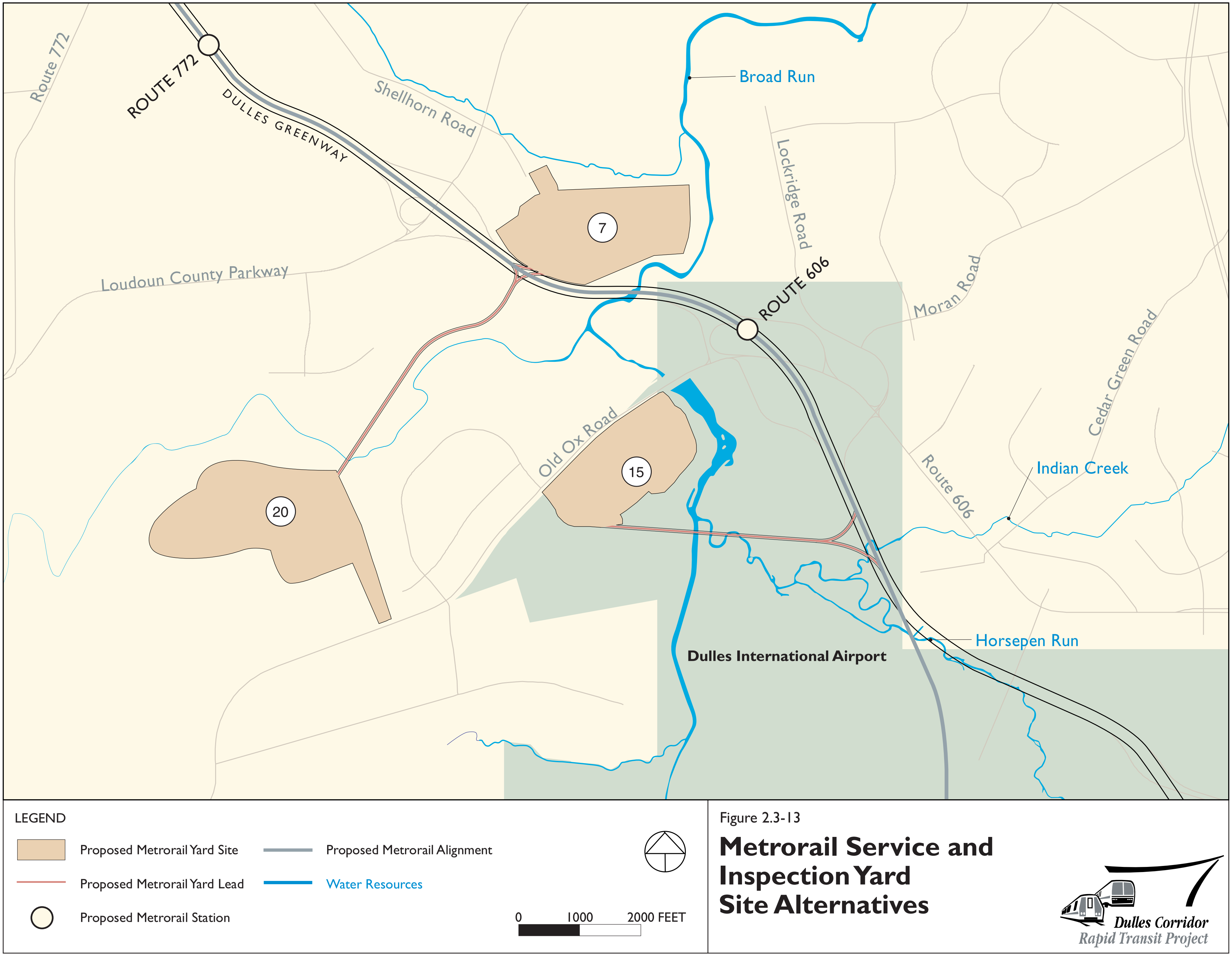



Figure 2.3-13

**Metrorail Service and Inspection Yard Site Alternatives**

Tie-breaker stations are much smaller than traction power substations. A typical tie-breaker station is approximately 45 feet by 20 feet and about 13 feet high. Tie-breaker stations are usually located at crossovers in the rail tracks. They break the rail line into sections, allowing power in one or more sections to be shut down for maintenance without affecting the power supply to the rest of the system. Tie-breaker stations would be combined with traction power substations wherever possible. Examples of these ancillary facilities are shown in Figure 2.3-14.

The traction power substations and tie-breaker stations were sited based on systems engineering requirements, environmental, and right-of-way constraints. A power analysis was conducted to determine the number and size of substations required and the optimal spacing for these stations. Depending on the alignment selected, there may be up to 23 traction power substations and 15 tie-breaker stations. The general locations for each are shown in Figure 2.3-15.

The Metrorail Alternative would also require that stormwater management facilities be added to many of the areas along the Dulles Toll Road and Dulles Greenway. Preliminary locations of stormwater management facilities are shown in Figure 2.3-16. These locations will be finalized once a locally preferred alternative is selected and detailed designs are available.

#### 2.3.2.4 Operations

The Metrorail Alternative would include operating plans for trains running on the Dulles Corridor line, on the existing Orange Line between Vienna and New Carrollton, and on the Orange Line between West Falls Church and New Carrollton. The alternative also includes operating plans for bus routes feeding into rail stations within the corridor, as well as regional routes running the full length of the corridor.

**Metrorail Operations**

Metrorail service would operate between Stadium-Armory Station on the Orange Line in the region's core and Route 772 in Loudoun County, and would be integrated with the existing Orange Line service.

Orange Line trains currently operate between Vienna and New Carrollton on 6-minute headways in the peak hours (6 to 9:15 a.m. and 3 to 6:15 p.m. weekdays) and 12-minute headways during off-peak hours, except after 10 p.m., when trains run every 20 minutes. This service is supplemented by a peak-hour service in the morning and afternoon running in the peak direction between West Falls Church and New Carrollton, also on 6-minute headways. The purpose of this supplemental service is to provide extra capacity during the "peak of the peak" when the heaviest passenger volumes on the Orange Line occur. This supplemental service results in 3-minute headways on the Orange Line in the peak direction between West Falls Church and New Carrollton during the morning and afternoon peak hours. The supplemental service trains are known as "trippers." The Orange Line currently uses six-car trains during the peak hours. A mix of four- and six-car trains are used during off-peak periods and for trippers.

Dulles Corridor service between Stadium-Armory Station and Route 772 Station would run on 6-minute headways during the morning and afternoon peak periods, replacing the peak-hour supplemental service on the Orange Line (the "trippers"). Dulles Corridor service would be different than the existing supplemental service because it would enter the Orange Line between the West Falls Church and East Falls Church stations and would terminate at the Stadium-Armory Station rather than running all the way to New Carrollton, as the supplemental service now does. The combined Orange Line and Dulles Corridor services would result in 3-minute peak-period headways between the East Falls Church and Stadium-Armory stations. This service would operate in both directions throughout the entire peak period, as opposed to operating only during the peak

hour, as is the case today. During the off-peak hours and over weekends, Dulles Corridor service would run on 12-minute headways, resulting in 6-minute combined headways on the Orange Line between East Falls Church and Stadium-Armory stations.

Both the Dulles Corridor service and the Orange Line service would use six-car trains in the peak periods and a mix of four- and six-car trains in the off-peak, and would run during the same hours of the day as current Metrorail service. As demand increases over time, trains would be lengthened to six or eight cars to meet the demand. The Dulles Corridor service would not require changes to the existing Metrorail system that are not included in the Baseline Alternative (see Section 2.2.1.4).

#### Feeder and Corridor Bus Network

The feeder and corridor bus network for the Metrorail Alternative would be similar to the feeder and corridor bus network for the BRT Alternative. The primary differences in the feeder and corridor bus network for the Metrorail Alternative would be in Tysons Corner, where the proposed rail stations would have more coverage of the Tysons Corner area than the BRT Alternative. Feeder and circulator routes would be adjusted accordingly. In addition, some service frequency adjustments would be made to the feeder bus routes to better coincide with Metrorail headways. These changes are identified in Chapter 6.

## 2.3.3 BRT/METRORAIL ALTERNATIVE

The BRT/Metrorail Alternative would combine elements of the BRT Alternative and the Metrorail Alternative. As shown in Figure 2.3-17, the Metrorail portion of the BRT/Metrorail Alternative would extend between the Metrorail Orange Line and Tysons Corner. At its eastern end, the alignment would follow the median of the Dulles Connector Road, diverging to serve the core of Tysons Corner using Alignment T1, T6, T9, or T4. As described earlier, the Tysons Corner segment could be entirely aerial, or it could include an underground segment. The Metrorail portion of the alignment would include three to six stations. West of Tysons Corner, the BRT portion of the BRT/Metrorail Alternative would be identical to the BRT Alternative. The number of stations and stops would vary depending on the selected BRT alignment option.

The BRT/Metrorail Alternative would also include a new BRT Maintenance and Storage Facility, and the addition of storage tracks to the West Falls Church S&I Yard. The Metrorail portion of the alternative would include traction power substations, tie-breaker stations, and stormwater management facilities. Opening year for the BRT/Metrorail Alternative is 2006.

### 2.3.3.1 Alignment and Stations

Between the Metrorail Orange Line and Tysons West Station, the BRT/Metrorail alignment would be identical to the Metrorail alignment described in Section 2.3.2.3.

Metrorail service would terminate at the Tysons West Station, where passengers would be able to transfer between BRT and Metrorail. BRT vehicles would access the station facility via exclusive ramps to and from the DAAR.

West of the Tysons West Station, the BRT/Metrorail Alternative would follow one of the three BRT alignments described in Section 2.3.1.3. For cost estimating purposes and for several of the effects analyses, especially transportation effects, the BRT 1 alignment is assumed. This alignment includes longer platforms and additional ancillary space to support future conversion to rail in the Mid-Corridor. BRT 1 is presented for the BRT/Metrorail Alternative in the facilities drawings (Volume IV of the Draft EIS).

**1** Traction Power Substation


**2** Traction Power Substation
(yellow building to the left)
in Urban Environment

**3** Tie-Breaker Station

**4** Tie-Breaker Station
in Suburban Environment

Figure 2.3-14

# Examples of Traction Power Substations and Tie-Breaker Stations

Dulles Corridor
Rapid Transit Project

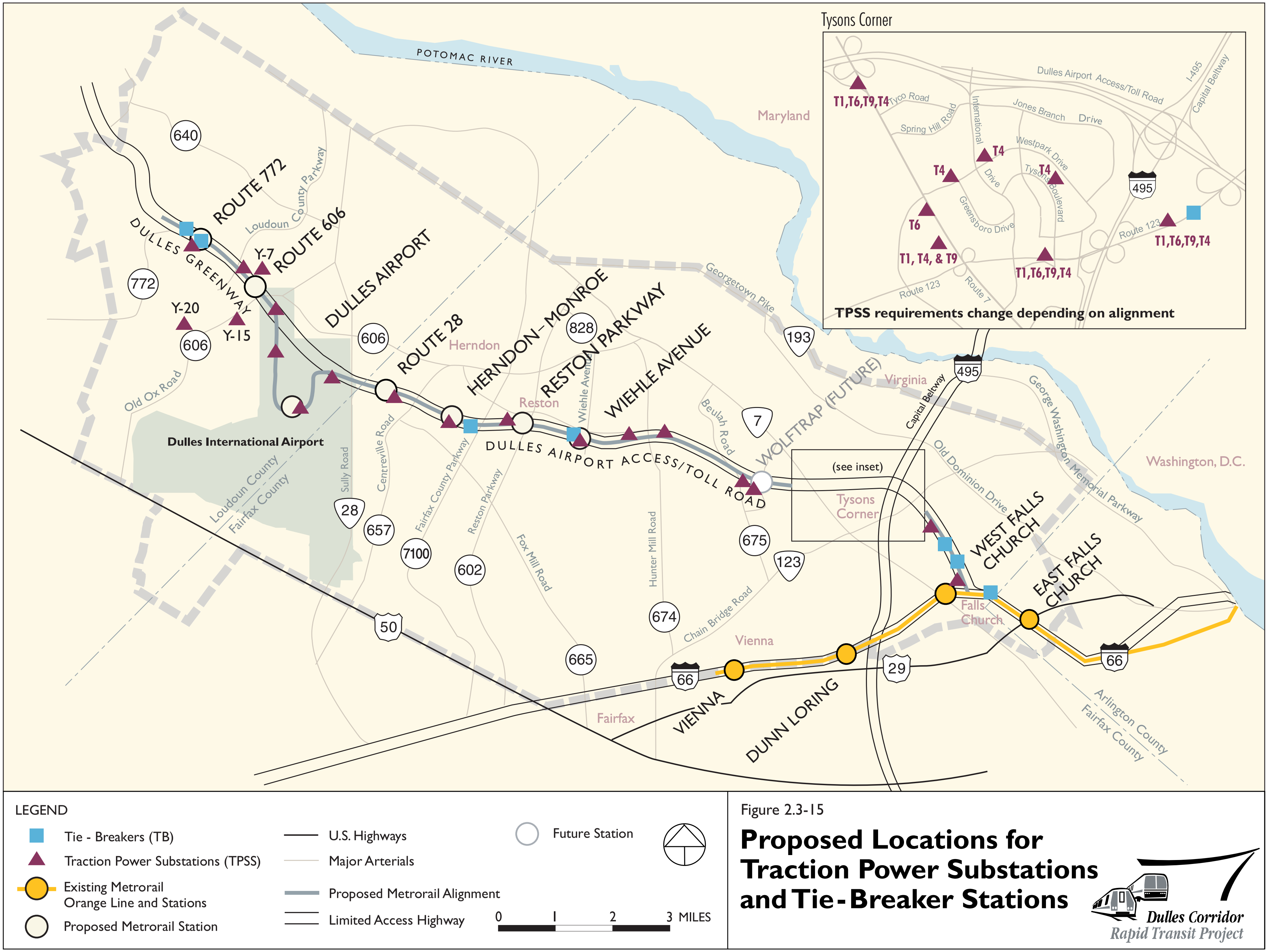



Figure 2.3-15

**Proposed Locations for Traction Power Substations and Tie-Breaker Stations**

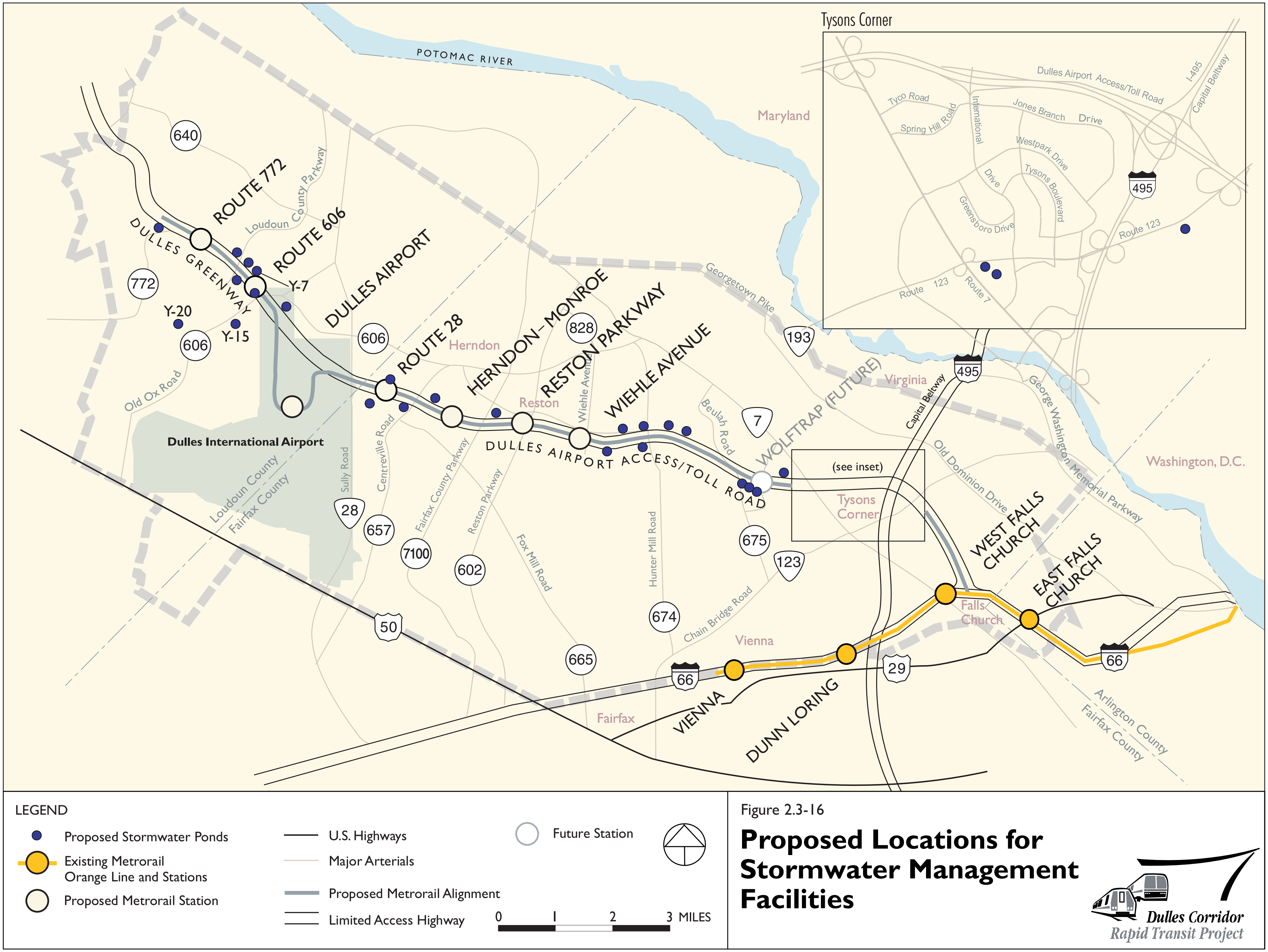



Figure 2.3-16

# Proposed Locations for Stormwater Management Facilities


LEGEND

Proposed Rail Alignment
Proposed BRT Alignment
Limited Access Highway
U.S. Highways
Major Arterials
Dulles Corridor Boundary

Proposed Metrorail Transfer Station
Existing Metrorail Orange Line and Stations
Proposed BRT Station
Proposed BRT Stop
Proposed Rail Station
Proposed BRT/Metrorail Transfer Station

0 1 2 3 MILES

Figure 2.3-17

# BRT/Metrorail Alternative (Shown with Alignment BRT1)

Dulles Corridor *Rapid Transit Project*

#### 2.3.3.2 Operations

The BRT/Metrorail Alternative would include operating plans for BRT, Metrorail, and the feeder and corridor bus network.

**BRT Operations**

The BRT portion of service for the BRT/Metrorail Alternative would be very similar to the service patterns identified for the BRT Alternative and depicted in Figure 2.3-6 in Section 2.3.1.4. Peak patterns for BRT 1 would be similar to the direct West Falls Church service shown for BRT 1, except that routes would terminate at the BRT/Metrorail transfer at Tysons West Station. If BRT 2 or BRT 3 are used for the BRT/Metrorail Alternative, then peak patterns and service frequencies would be similar to those shown for these alignment options under the BRT Alternative. However, for the BRT/Metrorail Alternative, all routes would terminate at the Tysons West Station.

**Metrorail Operations**

The rail operating plan for the BRT/Metrorail Alternative would be similar to the rail operating plan for the Metrorail Alternative. Dulles Corridor trains would operate on 6-minute headways during peak periods and on 12-minute headways during off-peak periods. However, instead of operating between the region's core and Route 772 in Loudoun County, this service would operate between Stadium-Armory Station and Tysons Corner. The Dulles Corridor service would replace the existing supplemental service on the Orange Line, resulting in a combined 3-minute headway between the Stadium-Armory and East Falls Church stations. Dulles Corridor service would utilize six-car trains in the peak periods and four-car trains during off-peak periods, and would operate during the same hours of the day as current Metrorail service. As demand increases over time, six- and eight-car trains would be used to meet the demand.

**Feeder and Corridor Bus Network**

As with the BRT or Metrorail Alternative, operations for the BRT/Metrorail Alternative would include modifications to the feeder and corridor bus network in the Dulles Corridor. The changes, which are identified in Chapter 6, would be similar to those for BRT or for Metrorail.

### 2.3.4 PHASED IMPLEMENTATION ALTERNATIVE

The Phased Implementation Alternative would combine the other three Build Alternatives into a program of rapid transit improvements that would be implemented in stages. Following the approach recommended in the 1999 MIS Supplement, the BRT Alternative would be constructed first; then Metrorail would be constructed from the Orange Line through Tysons Corner, connecting to BRT service between Tysons Corner and Loudoun County; and finally, Metrorail would be constructed between Tysons Corner and Loudoun County, replacing BRT service in the corridor (see Figure 2.3-18). This approach would allow decision-makers to begin to address the travel needs in the corridor with rapid transit in the near term, while allowing for future development of rail. It is anticipated that operations for BRT would begin in 2005. Metrorail through Tysons Corner would be constructed concurrently with BRT to Loudoun County, and would begin operation soon after implementation of full BRT (2006). Metrorail to Loudoun County is expected to be complete and operational by 2010.

The alignments for the Phased Implementation Alternative would be identical to those for the other three Build Alternatives. Initially, the alternative would use one of the three BRT alignments identified earlier. Metrorail through Tysons Corner would follow Alignment T1, T6, T9, or T4, and Metrorail to Loudoun County would be developed along the median of the DAAR, diverge into a tunnel at Dulles Airport, then surface and follow

the median of the Dulles Greenway to the vicinity of Route 772—the same alignment presented for the Metrorail Alternative. For each phase, the number of stations and stops would depend on the BRT and Metrorail alignments selected.

Each phase of the Phased Implementation Alternative includes new maintenance and storage facilities. The BRT Maintenance and Storage Facility and the Metrorail S&I Yard would be located either at separate sites or on the same site. As Metrorail is developed through Tysons Corner, additional storage tracks would be constructed at the West Falls Church Station S&I Yard. The Metrorail phases also include traction power substations, tie-breaker stations, and stormwater management facilities.

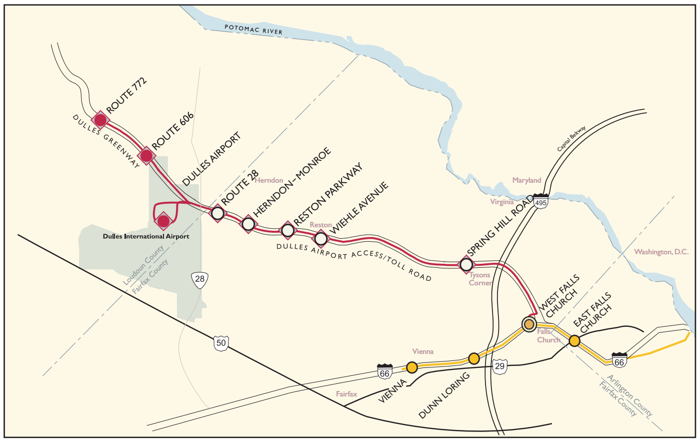
#### 2.3.4.1 Alignment and Stations

The BRT phase of the Phased Implementation Alternative would follow one of the three BRT alignments described in Section 2.3.1.3. For BRT 1 or BRT 2, the median stations in the Mid-Corridor would be built during initial construction for the BRT phase. The platforms would be constructed as permanent Metrorail platforms, with a platform height 3 feet 4 inches above the future top of rail. As described in Section 2.3.1.1, BRT vehicles would have a floor roughly 12 to 15 inches above the street level and would require platforms also at this approximate level. Accordingly, to accommodate BRT service, temporary fill would be placed in the track bed at the stations to raise the driving surface to a height compatible with low-floor buses.

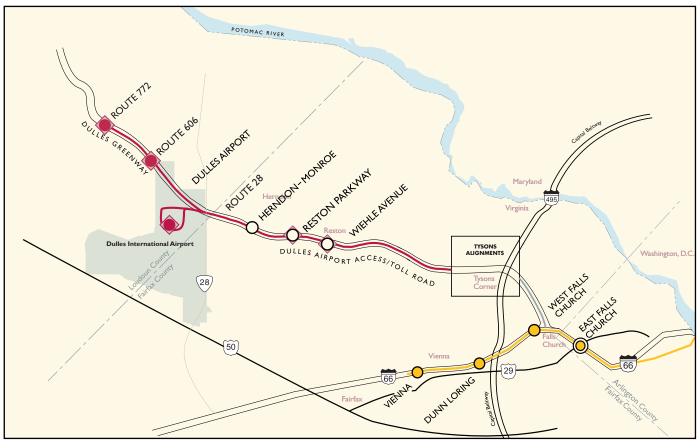
For the next phase of the Phased Implementation Alternative, Metrorail would be extended through Tysons Corner along one of the four alignments described for the Metrorail Alternative in Section 2.3.2.3. Initially, the rail line would end at the Tysons West Station, where passengers would be able to transfer between BRT and Metrorail. As described in Section 2.3.3.1, the station facilities for this station would connect to exclusive ramps to and from the DAAR.

Once Metrorail operations through Tysons Corner begin, BRT service at Spring Hill Road Station or Tysons-West*Park Transit Station would be discontinued. The roadway improvements as well as bus layover and employee welfare facilities at West Falls Church would remain for feeder bus operations. Faregates would return to their original configuration. For BRT 1, the Spring Hill BRT Station would be removed. The removal would include the median station, the pedestrian bridge, and the entrance pavilion at the Tysons-West*Park Transit Station. The bus bays and Kiss & Ride spaces at the Tysons-West*Park Transit Station that existed prior to BRT implementation would remain following the removal of the Spring Hill Road Station. For BRT 2 and BRT 3, the fare pavilion would be removed from the Tysons-West*Park Transit Station, and the fare collection equipment could be re-used elsewhere in the Metrorail system. The bus bays that were reconfigured to accommodate BRT vehicles would be returned to their original configuration.

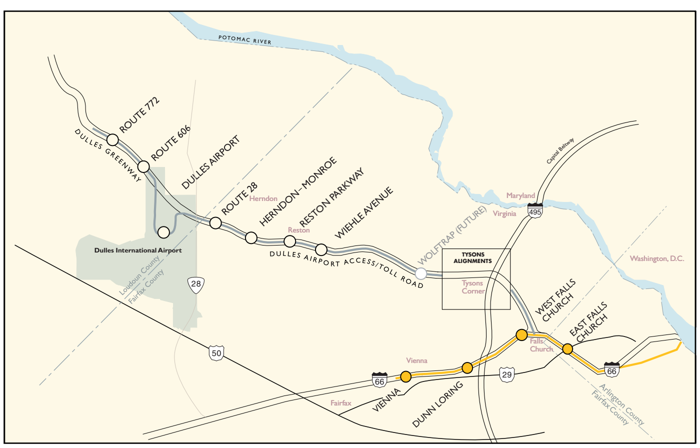
For the final phase of the Phased Implementation Alternative, the extension of Metrorail to Loudoun County, the alignment and stations would be identical to those described for the Metrorail Alternative in Section 2.3.2.3. The level of effort required to convert BRT to Metrorail in the Mid-Corridor would depend on the alignment selected for the BRT phase. Of the three alignments, BRT 1 would require the least effort to convert to Metrorail, because it would include all of the median stations in the Mid-Corridor section, and the BRT median stations would have been constructed as full, 600-foot Metrorail platforms. BRT 2 would not include a station at Route 28, and the shortened BRT platforms at the other median stations on this alignment would need to be expanded to the full Metrorail platform length during conversion. BRT 3 includes only one median station at Reston Parkway, therefore, three complete rail stations would need to be constructed for conversion to Metrorail.




## BRT Phase (BRT I)

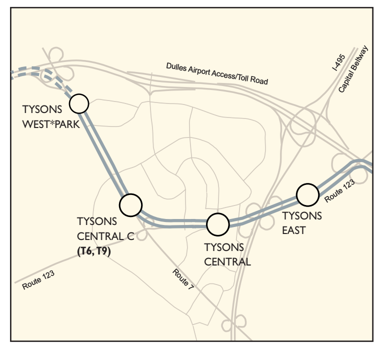



## BRT/Metrorail Phase



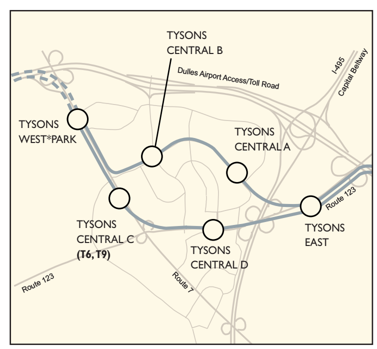

## Metrorail Phase

## Tysons Metrorail Alignments




Tysons Alignments T1, T6, and T9

BRT or Metrorail




Tysons Alignment T4

BRT or Metrorail

LEGEND

- Proposed Rail Alignment
- Proposed BRT Alignment
- Limited Access Highway
- U.S. Highways
- Major Arterials
- Proposed Metrorail Transfer Station
- Existing Metrorail Orange Line and Stations
- Proposed BRT Station
- Proposed BRT Stop
- Proposed Rail Station
- Proposed BRT/Metrorail Transfer Station

Figure 2.3-18

# Phased Implementation Alternative

Dulles Corridor
Rapid Transit Project

To convert the BRT stations for BRT 1 and BRT 2 to rail stations, the temporary fill would be removed so that the tracks could be built in the track bed. As noted above, for BRT 2, the platforms would also need to be extended to 600 feet to accommodate Metrorail trains.

Following the implementation of Metrorail along the full length of the Dulles Corridor, several BRT facilities would be removed or converted for other uses. Where possible, equipment and materials would be re-used or remain in place.

- The temporary BRT ramps connecting to Tysons West Station from the DAAR would either be removed or converted for other uses.
- Fare equipment and welfare facilities (lockers and restrooms for operators) for BRT at the Tysons West station facilities would be removed.
- The BRT pavilions at the Wiehle Avenue and Herndon-Monroe stops would be removed (BRT 3).
- BRT facilities at Dulles Airport would be removed.
- The BRT pavilion at the Route 606 stop would be removed or converted for other uses.
- The BRT pavilion at Route 772 would be removed and the BRT bus loop would be converted into Kiss & Ride parking. The new configuration of this lot would be identical to the design presented for the Metrorail Alternative.
- The BRT maintenance and storage facility would continue to operate, providing a western service facility for corridor feeder buses.

For Phased Implementation, the location of the BRT Maintenance and Storage Facility would depend on the site selected for the Metrorail S&I Yard. It would be possible to operate both the BRT and Metrorail facilities at Site 20; therefore, if this site were selected for the S&I Yard, the BRT facility would also be constructed at Site 20. Sites 7 and 15, however, are not large enough to also support a BRT Maintenance and Storage Facility and still avoid impacts to environmental resources. If one of these sites were selected for the S&I Yard, then the BRT facility would be constructed at Site 14, as for the BRT Alternative.

#### 2.3.4.2 Operations

For each successive phase of the Phased Implementation Alternative, the operating plan and feeder and corridor bus network would be identical to those described for the BRT, BRT/Metrorail, and Metrorail alternatives, respectively.

Initially, the Phased Implementation Alternative would use the operating plan described for the BRT Alternative in Section 2.3.1.4. Operations would generally not be affected by the completion of Metrorail construction through Tysons Corner. If BRT 2 or BRT 3 is selected for the BRT phase, then operations along Route 7, Tyco Road, and Spring Hill Road may be affected by construction that affects traffic on these routes. Maintenance-of-traffic plans for the regular traffic on the Dulles Connector Road, Route 7, Tyco Road, and Spring Hill Road would also take into account BRT operations.

Once construction of Metrorail through Tysons Corner is complete, BRT service between West Falls Church and Tysons Corner would be discontinued, and, initially, BRT and rail operations would follow the plan described for the BRT/Metrorail Alternative in Section 2.3.3.2. However, as BRT in the Mid-Corridor is converted to Metrorail, BRT operations would be affected if BRT 1 or BRT 2 are selected for the BRT phase.

For these alignments, the median operation of the BRT stations would be displaced during conversion. It is expected that rail construction and start-up testing would occur over a period of 15 to 18 months. During this period, BRT service would be relocated to the station facilities on the north and south sides of the Dulles Toll Road, an operation similar to that for BRT 3. Prior to this change in operations, the station facilities would be reconfigured to include BRT bus bays, a boarding area, and a fare pavilion.

If BRT 3 were used, BRT operations would not be greatly affected by construction of Metrorail in the Mid-Corridor. For this alignment, there would be only one median station at Reston Parkway. As described in Section 2.3.1.3, this station would be constructed during the BRT phase with a BRT platform at grade and a Metrorail platform above it. In addition, the structural support elements for the aerial rail alignment associated with this station would be constructed before BRT operations begin. Therefore, track construction and start-up testing would not affect BRT operations at this station.

After completion of Metrorail construction for the full length of the Dulles Corridor, the operating plan described in Section 2.3.2.4 for the Metrorail Alternative would go into effect.

## 2.4 CAPITAL COSTS

This section presents summary information on the capital costs for the Build Alternatives. It includes a brief description of the methodology used for estimating capital costs and a summary table that presents the overall costs of each alternative by cost category. Additional capital cost information is presented in Chapter 8.

### 2.4.1 ESTIMATING METHODOLOGY

Project capital costs were estimated in accordance with recommended FTA estimating methodology. The capital cost components of each alternative have been classified into one of eight cost categories:

- Guideway Elements;
- Maintenance and Storage Facility;
- Systems Elements (train control, traction power, communications, and fare collection);
- Stations;
- Vehicles;
- Special Conditions (demolitions, roadway modifications, utility relocations, environmental mitigation);
- Right-of-Way; or
- Soft Costs (allowances for engineering and final design, project management, contingencies, project insurance, and agency costs).

Project soft costs were calculated as a percentage of the estimated construction costs. The costs for the other project elements were estimated using the following approach.

Cost for guideway elements, stations, demolitions, roadway modifications, and right-of-way acquisition were determined using unit costs and estimated quantities for component parts. Sufficient engineering data was available to reasonably define the scope of work and estimate quantities for these categories.

Unit costs were derived from multiple resources, including DRPT, WMATA, and other historical cost data for other transit systems throughout the United States. Some of these sources include WMATA Level 3 Cost Data (June 1994); WMATA cost database (cost baselined to 1969); *Dulles Corridor Transportation Study – Methods Report* (September 1995); and VDOT year 2000 bid-letting results for various highway projects. All of these cost data were escalated to second quarter 2001 dollars using published WMATA escalation factors. Cost data for transit systems located in other geographic locations were modified using the location factors published in current *R.S. Means Heavy Construction Cost Data*. Furthermore, all cost resources were adjusted to reflect current local metropolitan Washington rates and conditions.

Estimates were also derived using data from similar projects across the country. These costs were then used directly or were converted to some unit measure (such as route feet) and applied as a unit cost. Historical data was typically used to estimate costs for the maintenance and storage facilities, vehicles, systems elements, utility relocations, and environmental mitigation.

Costs of right-of-way were determined by obtaining tax assessment records of affected properties and adjusting the assessed values upward to account for market value, easements, relocation of businesses for total acquisitions, replacement of facilities for partial acquisitions, and administrative costs. The validity of this method was confirmed by limited scope, restricted appraisals of a select number of affected properties. No cost has been assigned for use of the median within the Dulles Connector Road, the Dulles Airport Access Road, and the Dulles Greenway.

The basic labor and construction assumptions and criteria used in developing the cost estimates are as follows:

- No premium time on labor costs was included.
- Adequate experienced craft labor would be available.
- Normal productivity rates as historically experienced were used.
- Compatible trade agreements would exist in the region.
- No strike impacts would be experienced by the project.
- There would be sufficient experienced contractors available to perform the work.
- Normal Washington metropolitan-area weather would have impacts on construction schedule and costs.
- Existing state-of-the-art construction technology would be used.

### 2.4.2 CAPITAL COST SUMMARY

Using the methods described in Section 2.4.1, the escalated capital costs for each Build Alternative were estimated in year-of-expenditure (YOE) dollars. Due to the various alignment options, each alternative would have a range of costs. The costs for the high-end alignment options for each alternative are summarized by category in Table 2.4-1. (More information regarding YOE costs is available in Chapter 8.) Note that while the capital costs total reflects the most expensive alignment for each alternative, the cost shown for a specific category may not be the highest cost for that category across alignment options. For example, though Alignment T6 would be the most expensive alignment for the Metrorail Alternative overall, Alignment T4 would have the highest passenger station costs.

The capital costs presented in Table 2.4-1 vary depending upon the BRT alignment option and Metrorail alignment selected. The year-of-expenditure capital cost range for the BRT, BRT/Metrorail, Metrorail, and

**Table 2.4-1: Summary of Capital Costs for Build Alternatives (including financing, YOE dollars in millions)**

| Cost Category | Build Alternatives | | | |
|---|---|---|---|---|
| | BRT (BRT 1) | Metrorail (T6) | BRT/Metrorail (BRT 1/T6) | Phased Implementation (BRT 1 to T6) |
| Year of Opening | 2005 | 2010 | 2006 | 2005 – 2010 |
| Number of Stations/Stops: | 9 | 11 | 11 | 11 |
| Guideway Elements | – | $ 691.6 | $247.5 | $685.3 |
| Yards & Shops | $50.0 | $144.7 | $92.1 | $192.6 |
| System Elements | $24.2 | $312.8 | $116.7 | $320.5 |
| Passenger Stations | $163.0 | $627.2 | $385.1 | $696.6 |
| Vehicles | $84.6 | $465.1 | $149.9 | $498.4 |
| Special Conditions | $29.1 | $101.3 | $78.5 | $104.4 |
| Right-of-Way | $44.5 | $143.6 | $110.8 | $143.6 |
| Soft Costs | $86.0 | $615.0 | $273.5 | $654.0 |
| Subtotal (YOE) | $481.4 | $3,101.3 | $1,454.1 | $3,295.4 |
| Financing | $8.0 | $145.5 | $42.6 | $179.6 |
| **Grand Total** | **$489.4** | **$3,246.8** | **$1,496.7** | **$3,475.0** |

**Table 2.4-2: Summary of Capital Cost Ranges for the Build Alternatives and Alignment Options (YOE dollars in millions)**

| Alignment Option | Capital Cost | Financing Cost | Total Cost |
|---|---|---|---|
| **BRT** | | | |
| BRT 1 | $481.4 | $8.0 | $489.4 |
| BRT 2 | $349.1 | $8.0 | $357.1 |
| BRT 3 | $342.7 | $8.0 | $350.7 |
| **Metrorail** | | | |
| T1 | $2,937.3 | $145.5 | $3,082.8 |
| T6 | $3,101.3 | $145.5 | $3,246.8 |
| T9 | $2,982.6 | $145.5 | $3,128.1 |
| T4 | $3,080.4 | $145.5 | $3,225.9 |
| **BRT/Metrorail** | | | |
| BRT 1/T1 | $1,303.1 | $42.6 | $1,345.7 |
| BRT 1/T6 | $1,454.1 | $42.6 | $1,496.7 |
| BRT 1/T9 | $1,344.7 | $42.6 | $1,387.3 |
| BRT 1/T4 | $1,434.6 | $42.6 | $1,477.2 |
| **Phased Implementation** | | | |
| T1 | $3,131.4 | $179.6 | $3,311.0 |
| T6 | $3,295.4 | $179.6 | $3,475.0 |
| T9 | $3,176.7 | $179.6 | $3,356.3 |
| T4 | $3,274.5 | $179.6 | $3,454.1 |

Phased Implementation alternatives and alignment options are presented in Table 2.4-2. The BRT cost differences reflect the difference in the number of stations (or stops), and BRT fleet sizes between the alignment options. The cost range in the BRT/Metrorail, Metrorail, and Phased Implementation estimates reflects the

various alignments under consideration in the Tysons Corner area. The BRT/Metrorail and Phased Implementation alternatives assume construction of BRT 1 stations and stops.

The above costs estimates assume Metrorail service in the Dulles Corridor operates with eight-car trains.

## 2.5 OPERATING AND MAINTENANCE COSTS

This section describes the methodology used for estimating the operating and maintenance (O&M) costs for the Baseline and Build Alternatives, and includes summary information on the projected costs. Though capital cost estimates were not required for the Baseline Alternative, it was necessary to estimate the O&M costs for this alternative in order to determine the incremental increase in costs required for each Build Alternative. Additional information on O&M costs is provided in Chapter 8.

### 2.5.1 ESTIMATING METHODOLOGY

The O&M costs for the Baseline Alternative and the Build Alternatives were calculated based on the O&M costing methods used by each of the operators providing transit service within the corridor. These methods are outlined below and in Section 8.3. The *Transit Operations & Maintenance Plan* (June 2002) provides the complete methodology used in determining the operating costs.

O&M costs for the opening year and forecast year (2025) were developed for BRT, Metrorail, Fairfax County bus operations, Loudoun County Commuter Service bus operations, and WMATA bus operations.

BRT and Metrorail costs were developed using the WMATA O&M cost model updated and recalibrated with WMATA FY 2002 data. The model is structured to estimate costs in five categories: joint expenses, facilities maintenance, traction power, Metrobus operations, and Metrorail operations. BRT operations were further adjusted according to the type of station/stop served. The BRT and Metrorail operation and maintenance costs represent the new service contained within one of the Build Alternatives. Annual O&M estimates are inflated to year-of-expenditure dollars using consumer price index projections from DRI-WEFA.

Fairfax County Connector, Loudoun County Commuter Service, and Metrobus O&M baseline costs were based on cost per revenue-hour provided by the agencies. The overall operating cost was determined by multiplying the revenue hours of operation by the cost per revenue hour.

Incremental changes in O&M costs for each jurisdiction are presented in Section 8.3.3.

### 2.5.2 O&M COST SUMMARY

Based on the costing techniques described above, O&M cost estimates for the Baseline Alternative and the three Build Alternatives were prepared for the opening year and the horizon year. The estimates for the Build Alternatives are shown in Table 2.5-1 as the incremental increase over the Baseline Alternative in year-of-expenditure dollars. In addition, the 15-year and average annual O&M costs for the alternatives were estimated in current-year dollars. These estimates are shown for select alignments in Table 2.5-2. The values shown for the Build Alternatives represent the incremental increase over the Baseline Alternative.

The range shown for the BRT and Metrorail alternatives reflects the variation in O&M costs for the different alignment options. BRT 3 would have the highest annual O&M costs for the BRT Alternative, and Alignment T4 would have the highest annual costs for the Metrorail Alternative.

**Table 2.5-1: Summary of Operating and Maintenance Costs (YOE dollars in millions)**

| Alternative | Opening Year | Incremental Annual O&M Cost Over the Baseline Alternative | |
|---|---|---|---|
| | | Opening Year | 2025 |
| BRT | 2005 | $20.7 – 26.8 | $54.1 – 64.2 |
| Metrorail | 2010 | $106.7 – 110.8 | $176.5 – 184.2 |
| BRT/Metrorail | 2006 | $52.9 – 57.1* | $107.2 – 114.9 |
| Phased Implementation | 2005-2010 | $20.7* | $176.5 – 184.2 |

* Assumes BRT 1.
Range shown for alternatives reflects the variation in costs for the different alignment options.
Source: *Transit Operations and Maintenance Plan* (June 2002), Tables 10-1 and 10-2.

**Table 2.5-2: Summary of Average O&M Costs over 15-Year Period (2001 dollars in millions)**

| Alternative | 15 Year O&M Cost (2010 – 2025) | Average Cost per Year | Incremental Change from Baseline Annual |
|---|---|---|---|
| Baseline | $ 7,660.0 | $ 510.7 | – |
| Incremental Increase for BRT (BRT 1) | $ 309.0 | $ 20.6 | 4.0% |
| Incremental Increase for BRT/Metrorail (BRT 1/T6) | $ 659.3 | $ 43.9 | 8.6% |
| Incremental Increase for Metrorail and Phased Implementation (T6) | $ 1,132.5 | $ 75.5 | 14.8% |

The Baseline Alternative includes the project corridor O&M costs for Fairfax County, Loudoun County, and WMATA bus service, plus systemwide WMATA Metrorail costs.
Source: *Transit Operations and Maintenance Plan* (June 2002). Tables 10-1 and 10-2.

Although BRT 3 and Alignment T4 would have the highest operating costs over a 15-year period, the costs for BRT 1 and Alignment T6 are summarized in Table 2.5-2 for comparison against the capital costs shown for these alignment options in Table 2.4-1.

Information regarding the estimated operating revenue and projected subsidy allocation for each Build Alternative can found in Sections 8.3.2 and 8.3.3.

## 2.6 ALTERNATIVES PREVIOUSLY CONSIDERED BUT NOT CARRIED FORWARD

This section provides an overview of the process that led to the selection of the Build Alternatives evaluated in this Draft EIS, and summarizes the reasons why particular alternatives were eliminated from further consideration. A more comprehensive description of the evaluation methodology and the screening evaluation can be found in the *Evaluation Methodology Report* (November 2000) and the *Final Alternatives Analysis Report*. The latter report serves as a detailed record that all reasonable alternatives for the project were examined and presented to the public during the preliminary engineering and environmental review process.

### 2.6.1 INITIAL NEPA ALTERNATIVES

Numerous alternatives were evaluated for the Dulles Corridor Rapid Transit Project, as listed in Table 2.6-1. The initial set of alternatives included various rapid transit modes, alignments, station locations, and ancillary facilities. These alternatives were developed based on recommendations from the MIS and MIS Supplement (see Section 2.1) and the scoping process for the Draft EIS.

**Table 2.6-1: Initial NEPA Alternatives**

| | |
|---|---|
| **Modes** | BRT<br>Metrorail<br>* Light rail transit (LRT)<br>* Personal rapid transit<br>* Monorail<br>* Feeder system to Metrorail stations in Tysons Corner (LRT, people mover)<br>BRT or express buses in a dedicated lane on the DAAR |
| **Alignments** | BRT Alignment. Alignment recommended in MIS Supplement. Serves Tysons Corner via DAAR with station at Spring Hill Road.<br>Line O1. Orange Line thru Tysons Corner via Dulles Connector Road.<br>Line O2. MIS Alignment with western leg that provides service to West Falls Church Station.<br>Line T1. Tysons Corner via Route 123 and Route 7.<br>Line T2. Tysons Corner aerial loop via Route 123, Route 7, and Westpark Drive.<br>Line T3. Alignment that connects the Dulles Corridor Rapid Transit Project to a possible rail line in the Capital Beltway corridor.<br>Line T4. Alignment T2 with pocket tracks instead of loop connectors.<br>Line T5. Underground loop alignment.<br>Line T6. Alignment T1 with an additional station.<br>Line T7. Alignment from the Orange Line through Tysons Corner via Route 7.<br>* Line T8. Station in DAAR near Spring Hill Road that connects to a feeder system to serve Tysons Corner.<br>Line T9. Alignment T1 with a completely aerial structure.<br>Line T10. Alignment T2 with an additional track on the southern leg of the loop.<br>Line T11. Large aerial loop that would include a station adjacent to the Capital Beltway. This alignment could connect to Alignment B1 as well as a possible future transit line in the Beltway corridor. (This alignment was developed by WMATA subsequent to the scoping process.)<br>Line B1. Orange Line connection via the Capital Beltway.<br>Line D1. Tysons Corner to Dulles Airport via DAAR or DAAR median.<br>* Line D2. Direct service to Reston Town Center via the Washington & Old Dominion Railroad Regional Park.<br>Line A1. Dulles Airport via service roads for BRT and underground alignment for Metrorail.<br>Line L1. Dulles Airport to Route 772 in Loudoun County via Dulles Greenway.<br>Line S1. Combined rail alignments in Dulles, I-66, Route 50, and Route 28 corridors. |
| **Stations** | Spring Hill Road (BRT)<br>Tysons East (Metrorail)<br>Tysons Central (Metrorail, T1)<br>Tysons Central Alternative. Shift of Tysons Central Station for T1 to the east. (Metrorail)<br>Tysons Central A, B, C, and D (Metrorail, T2)<br>Tysons West (Metrorail)<br>Tysons East and West with third tracks and second platform (comparable to configuration at National Airport). (Metrorail)<br>BRT/Metrorail Transfer Station (location to be determined)<br>* Wolf Trap Farm Park. Determine whether station is viable. (Metrorail)<br>Addition of Hunter Mill Road Station (Metrorail)<br>Wiehle Avenue (BRT to Metrorail)<br>* Removal of Wiehle Avenue Station (BRT to Metrorail)<br>Reston Parkway (BRT to Metrorail)<br>Relocate Wiehle Avenue and Reston Parkway stations near or under the highway overpasses (BRT to Metrorail)<br>Herndon-Monroe (BRT to Metrorail)<br>Route 28 BRT Station. Addition of a BRT station in DAAR median. (BRT to Metrorail)<br>Route 28 (Metrorail)<br>Accommodate a future LRT station at Route 28 (Metrorail)<br>Dulles Airport (BRT, Metrorail)<br>Route 606 (BRT, Metrorail)<br>Route 772 (BRT, Metrorail) |
| **Ancillary Facilities** | Three yard sites along Dulles Greenway north of Dulles Airport<br>One yard site south of the airport, adjacent to Route 28 and south of the Dulles Toll Road<br>Additional yard sites identified during agency coordination<br>West Falls Church Yard Complex<br>Traction power substations<br>Tie-breaker stations |

* Indicates alternatives that were examined during the MIS process, but were eliminated from further evaluation. For the stations, "BRT to Metrorail" indicates BRT stations that would be convertible to Metrorail, and "BRT, Metrorail" indicates locations that would have BRT stops or Metrorail stations.
At this point in the analysis process, it was assumed that the BRT Maintenance and Storage Facility and the Metrorail S&I Yard would be collocated on a single site.

Because of the large number of rail alignment alternatives, the corridor was divided into geographic sections to facilitate presentation and discussion. The labels of the alignments conform to the sections of the corridor below, and are presented in general east-to-west order:

- O is for the section of line connecting to the existing Metrorail Orange Line.

- B is for a transit line under study in the Beltway corridor.
- T is for the section of line in Tysons Corner.
- D is for the section of line in the Dulles Airport Access Road.
- A is for the section of line at Dulles Airport.
- L is for the section of line in Loudoun County.
- S is for a rail line in the Sully Road (Route 28) corridor.

The development of the initial NEPA alternatives is described in more detail in the *Scoping Process Report* (September 2000). Several of the alignments considered and potential yard sites are shown in Figures 2.6-1 to 2.6-4. Some alternatives were added following publication of the *Scoping Process Report*, in response to either ongoing engineering studies or additional public comment.

### 2.6.2 EVALUATION PROCESS

To determine which alternatives would be evaluated in this Draft EIS, the initial NEPA alternatives were evaluated and screened in a two-phase process: initial screening and intermediate screening. As outlined in the *Evaluation Methodology Report*, the process applied increasingly detailed and comprehensive measures of effectiveness to a decreasing number of alternatives. The alternatives advanced or carried forward for further evaluation at the end of each phase were the ones that were determined to best achieve the following:

- Improve transportation service;
- Increase transit ridership;
- Support future development;
- Support environmental quality;
- Provide cost-effective, achievable transportation choices; and
- Serve diverse populations.

These project goals are based on those originally developed during the 1997 MIS.

The intent of the initial and intermediate screening evaluations was to compare the relative performance of a large number of alternatives using a small number of criteria. The four basic categories of evaluation criteria identified in the *Evaluation Methodology Report* are social, environmental, economic, and transportation. Analysis of performance relative to these criteria enabled the project team to distinguish between those alternatives that were likely to be most effective in meeting the project's goals and those that were not.

The results of the alternatives screening process are presented in Table 2.6-2. Each of the alternatives eliminated from further consideration is discussed in more detail in the following sections.

Following the publication of the *Final Alternatives Analysis Report*, additional alternatives and yard sites were introduced as part of the ongoing scoping process. In order to provide an equivalent evaluation, these alternatives were assessed using the same criteria applied during initial and intermediate screening. In some cases, new alternatives were carried forward for detailed evaluation in the Draft EIS in lieu of other alternatives that were previously carried forward. The results of these analyses are documented in post-screening technical memoranda.

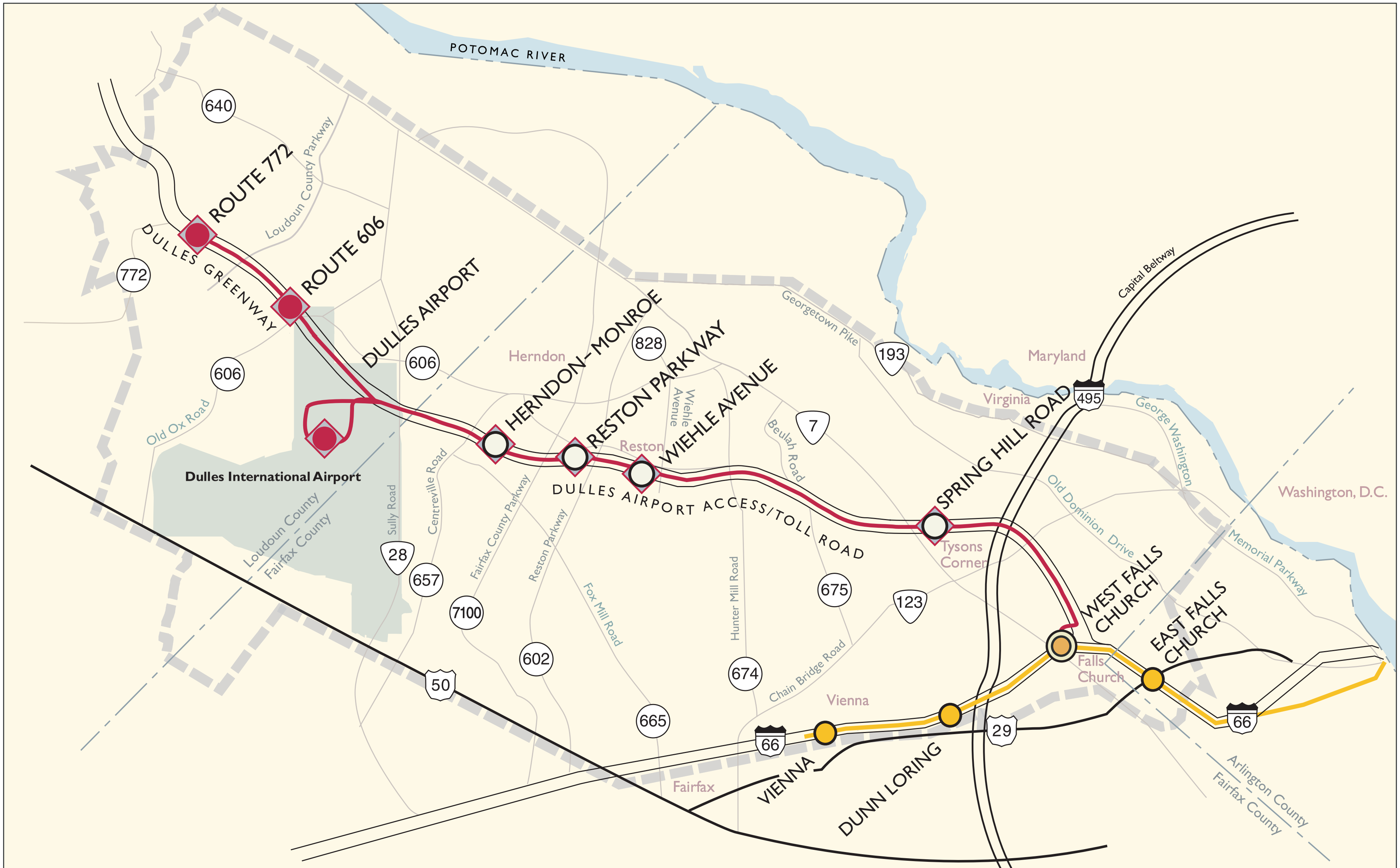
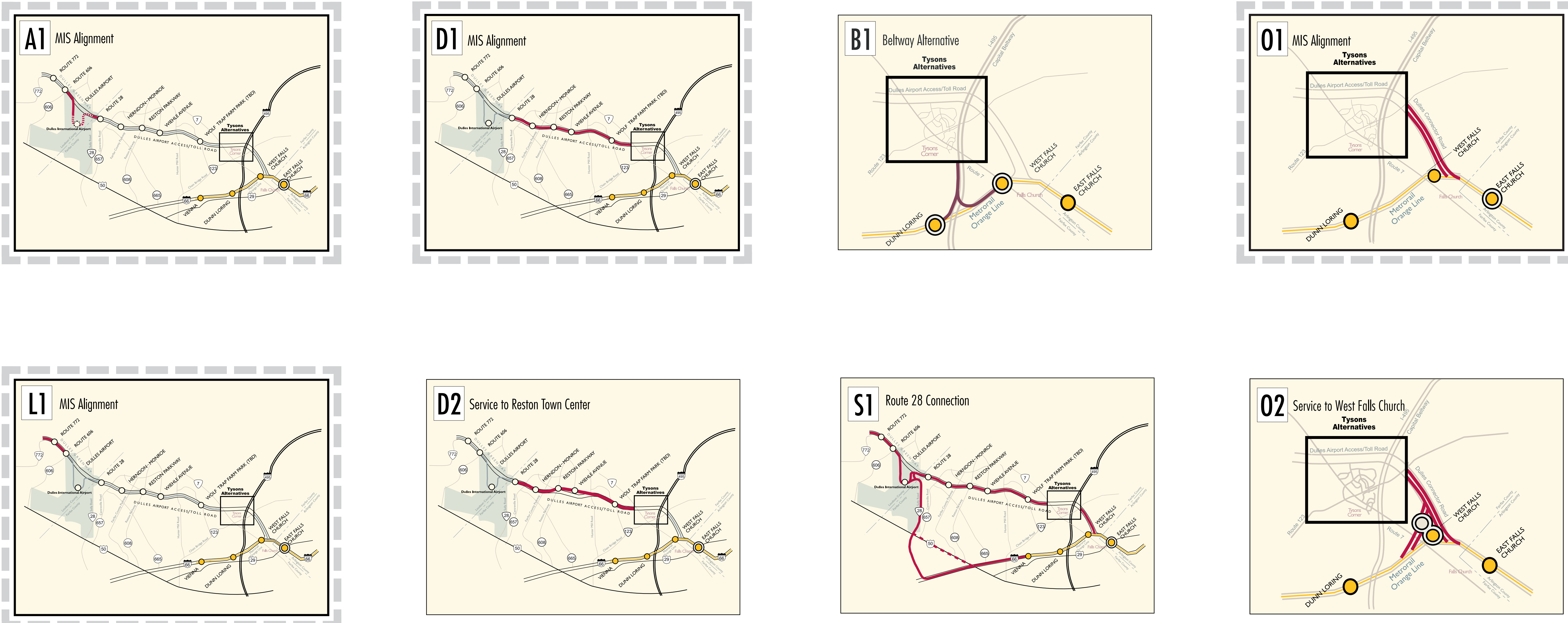



Figure 2.6-1

## BRT Alignment Considered during Alternatives Screening




LEGEND

- Existing Metrorail Orange Line and Stations
- Proposed Station
- Proposed Transfer Station
- Proposed Rapid Transit
- Metrorail Alternative
- Limited Access Highway
- U.S. Highways
- Major Arterials
- Alignments Carried Forward

Figure 2.6-2

**Dulles Corridor Alignments Considered during Alternatives Screening**

Dulles Corridor
Rapid Transit Project

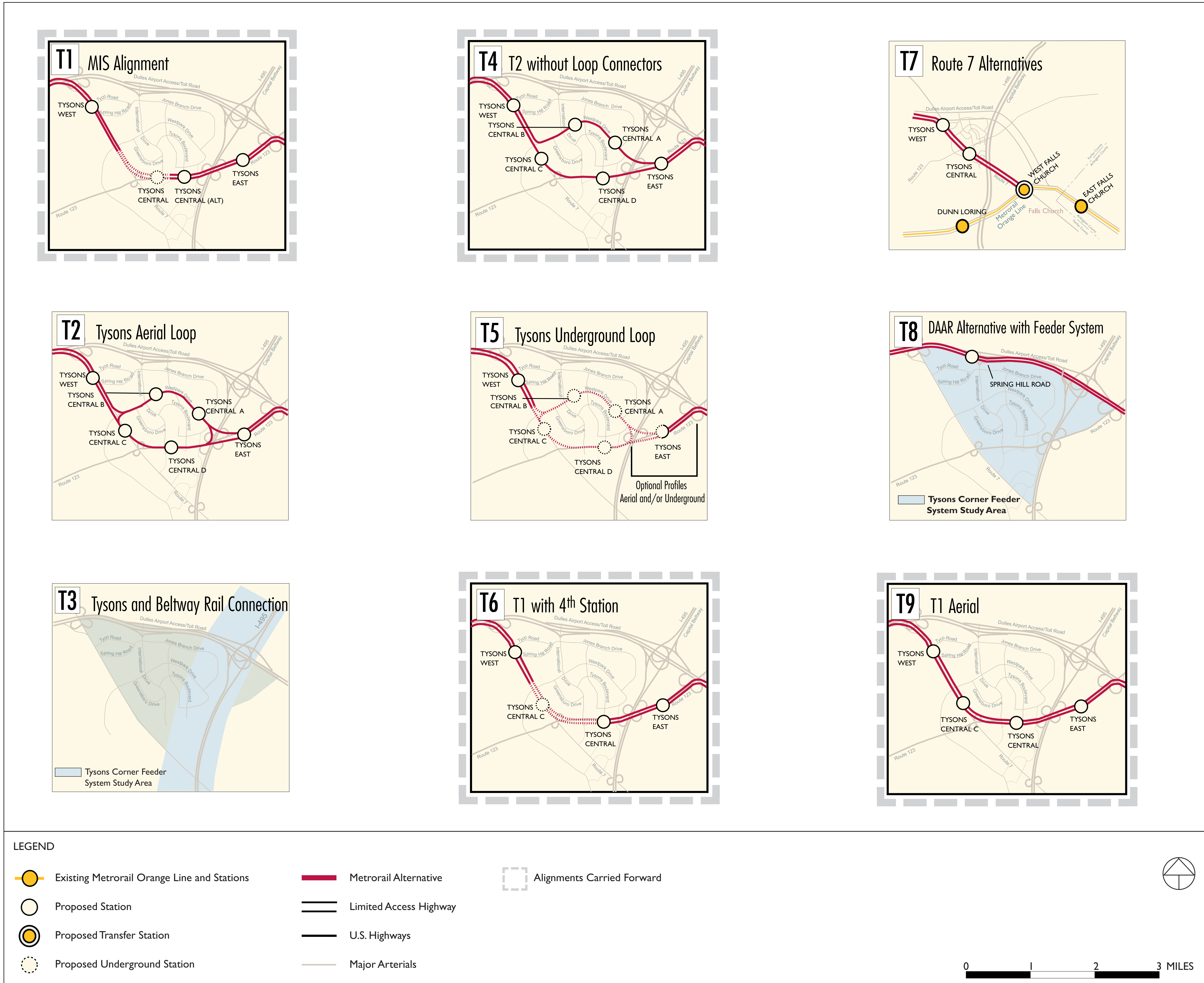
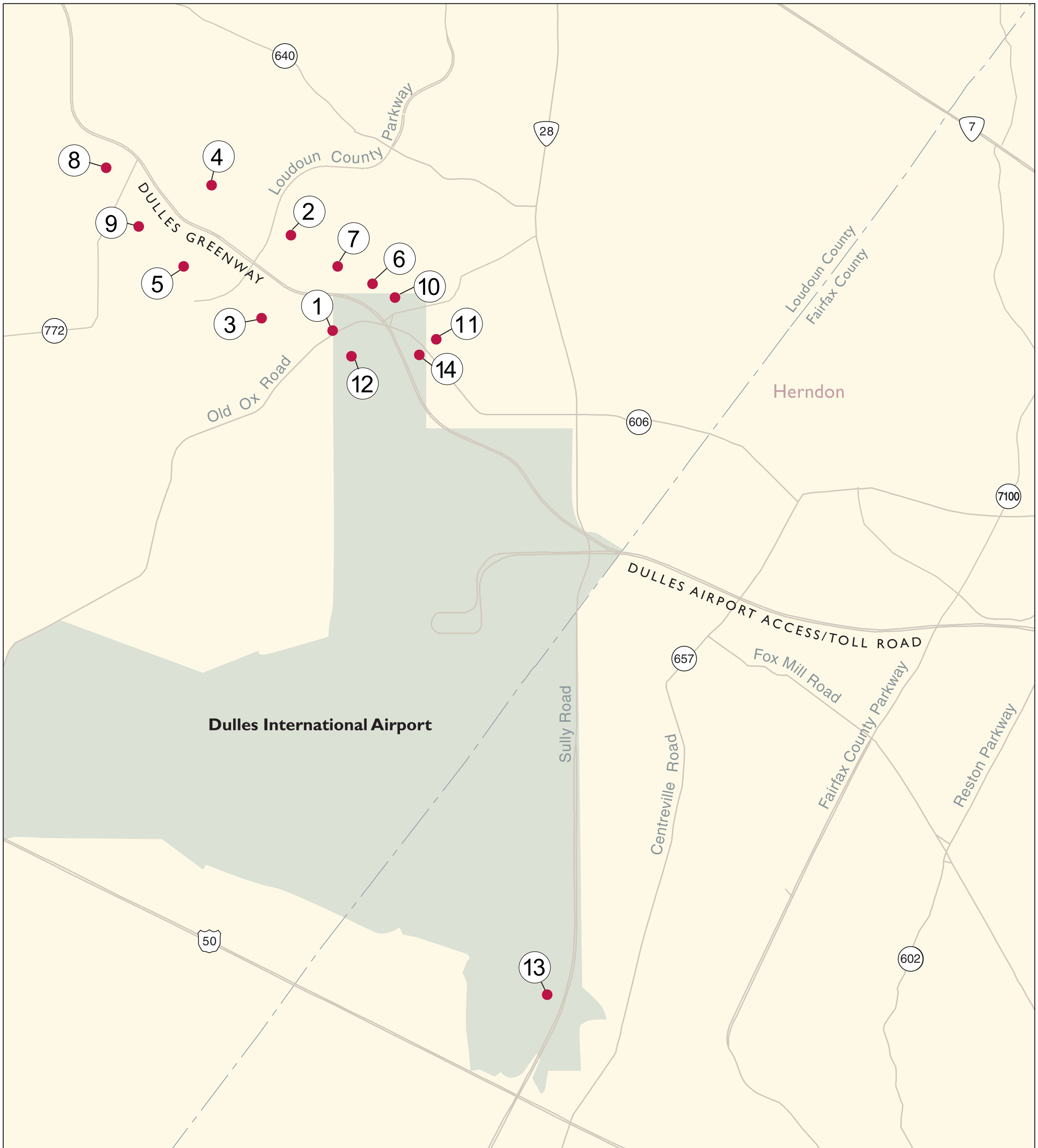



Figure 2.6-3

**Tysons Corner Alignments Considered during Alternatives Screening**

*Dulles Corridor Rapid Transit Project*




LEGEND

- Approximate location of Potential Yard Sites Considered During Screening
- County Boundary
- Major Arterials

0 3000 6000 FEET

Figure 2.6-4

# Potential Yard Sites Considered during Alternatives Screening

Dulles Corridor
Rapid Transit Project

**Table 2.6-2: Alternatives Considered During the Screening Process**

| | Alternatives Eliminated in Initial Screening | Alternatives Eliminated in Intermediate Screening | Alternatives Evaluated in Draft EIS |
|---|---|---|---|
| MODES | Personal Rapid Transit<br>Light Rail Transit (LRT)<br>Monorail<br>Feeder System to Metrorail stations in Tysons Corner<br>BRT or Express Buses in a Dedicated Lane on the DAAR | None | BRT<br>Metrorail |
| ALIGNMENTS | Route 7 (T7)<br>Tysons DAAR Station with Feeder System (T8)<br>Partial Double-Track Loop (T10)<br>Large Aerial Loop (T11)<br>Beltway Access thru Tysons (B1)<br>Direct Service to Reston Town Center (D2)<br>Dulles, I-66, Route 50, and Route 28 Connection (S1) | Service to West Falls Church (O2)<br>Tysons Loops (T2, T5)<br>Interface with Beltway Rail Line (T3)[a] | MIS Supplement BRT Alignment[b]<br>MIS Rail Alignment (O1, T1, D1, A1, L1)<br>Tysons MIS Alignment Variations (T6, T9)[d]<br>Tysons Loop (T4) |
| STATIONS | Stations that were only associated with Alignments T7, T8, T11, and D2<br>Addition of Hunter Mill Road Station<br>Removal of Wiehle Avenue Station | Platform connection to West Falls Church for O2<br>The MIS Tysons Central Station for T1<br>Wolf Trap Farm Park Station as a special use station[c]<br>Relocation of the Wiehle Avenue and Reston Parkway stations under or near the highway overpasses<br>Accommodation for Route 28 LRT[a] | Stations and stops associated with the MIS Supplement BRT Alignment<br>Stations associated with the MIS Metrorail Alignment and its variations (O1, T1, D1, A1, L1 and T6, T9)[d]<br>Stations associated with the Tysons loop alignment (T4)<br>Route 28 BRT Station<br>Tysons Central Alternative Station<br>Tysons East and West stations with third track |
| ANCILLARY FACILITIES | Nine potential yard sites in Loudoun County | Two sites for BRT maintenance facility and rail yard near Route 606 interchange (Y6, Y10)<br>Rail yard site at south end of Dulles Airport property (Y13)<br>Two potential yard sites in Loudoun County and three sites on Dulles Airport as part of a supplemental study. | One rail yard site near Route 606 interchange (Y7)[e]<br>One BRT maintenance facility site at north end of Dulles Airport property (Y14)[e]<br>Two additional sites south of the Dulles Greenway along Route 606 (Y15, Y20)[f]<br>West Falls Church Yard Complex |

a In the future, the project team will cooperate with the groups implementing these projects and coordinate design with them to the extent feasible.

b The BRT alignment was refined after Intermediate Screening. Two options were added with varying station and stop locations.

c Only provisions to accommodate a future station at Wolf Trap Farm Park will be evaluated in the Draft EIS.

d Alignment T9 was refined after Intermediate Screening. It remains a largely aerial alignment, with a short underground section. A technical memorandum was prepared discussing the rationale for revising Alignment T9.

e Site 14 was introduced after Intermediate Screening. It was carried forward in lieu of Site 7 for the BRT maintenance facility.

f Sites 15 and 20 were introduced after Intermediate Screening as part of the Supplemental Rail Yard Study (described in more detail in Section 2.6.5). Site 15 would include a rail yard only. Site 20 could support both a BRT maintenance facility and a rail yard.

## 2.6.3 INITIAL SCREENING

The initial screening criteria, as defined in the *Evaluation Methodology Report,* included consistency with land use plans, order of magnitude capital costs, service to activity centers within the Dulles Corridor and the region, and compatibility with existing infrastructure, among others. At this level of analysis, most measures were qualitative. Because not all of these criteria are sensitive to differences between modes, the initial screening was conducted as a two-part process. First, the modes (i.e., Metrorail, BRT, light rail, personal rapid transit, and

monorail) were reviewed using appropriate measures of effectiveness. Then, the alternative alignments, stations, and ancillary facilities were evaluated. The following sections identify the alternatives that were eliminated from further study during initial screening and summarize why these alternatives were not carried forward for additional analysis.

#### 2.6.3.1 Modes

Several modes added to the list of alternatives during the scoping process were previously examined and eliminated from further study during the 1997 MIS. The project team reviewed the reasons for the decisions to eliminate these modes and reaffirmed the validity of these decisions based on current data.

**Light Rail Transit**

Light rail transit was suggested in lieu of Metrorail because it is a rail technology that can operate on alignments that are not grade-separated. Typically, light rail is a mode that consists of passenger rail cars operating in short trains. The cars are usually powered electrically by overhead catenary lines, although diesel-powered systems do exist. This mode was eliminated during the 1997 MIS.

It was determined that light rail would not be as cost-effective as Metrorail because it would require a transfer at the Metrorail Orange Line, which would reduce ridership in the Dulles Corridor. Also, the capital costs for light rail would be similar to those for Metrorail because it would have to follow the same grade-separated alignment as a Metrorail alternative through Tysons Corner and at Dulles Airport, reducing any potential cost-savings benefits. For these reasons, light rail transit was eliminated from further consideration.

**Personal Rapid Transit**

Personal rapid transit is a technology typically envisioned to function like an automobile in an urban setting. The technology uses small, low-capacity vehicles (one to four persons) and, ideally, would have numerous closely spaced stations in a dense guideway network.

This mode, eliminated during the 1997 MIS, was also suggested in lieu of Metrorail, but was eliminated from further consideration because it is not a technology intended to provide the long-distance, high-speed service required in the Dulles Corridor.

**Monorail**

Monorail consists of automated transit vehicles operating on or suspended from a single rail, beam, or tube. Even though it was eliminated during the 1997 MIS, monorail was considered in lieu of Metrorail in the Dulles Corridor. As was the case with light rail, monorail would not be as cost-effective as a Metrorail alternative due to comparable or higher capital costs and lower ridership resulting from the forced transfer at the Orange Line. Therefore, monorail was eliminated from further consideration.

**Feeder Systems**

Different feeder system alternatives considered for the project included light rail transit and an elevated people-mover within Tysons Corner as a feeder to Dulles Corridor stations. People-movers are typically automated rail systems that use passenger vehicles operating singly or in multi-car trains. The guideway for this mode must be grade-separated.

These options for a fixed-guideway feeder system were eliminated from further consideration because they would not be cost-effective. Analysis conducted for the MIS demonstrated that a fixed-guideway feeder system would not enhance ridership on a Dulles Corridor line that followed either a Route 123-Route 7 alignment or

a loop configuration in Tysons Corner. Moreover, the analysis showed that such a feeder system would substantially add to the cost of the project. Given that the feeder system would not substantially increase ridership on the Dulles Corridor line as a whole, it would be considered an unreasonable expenditure in the context of the Dulles Corridor Rapid Transit Project.

#### BRT or Express Bus (in lieu of BRT) Operating in Dedicated Third Lane on the DAAR

These options were eliminated from further consideration because current and future traffic projections for the existing configuration of the DAAR do not warrant construction of a dedicated lane as part of the Dulles Corridor Rapid Transit Project. Because the DAAR only provides service to and from the airport and does not serve general traffic, it is expected that traffic flow on this road during peak periods will be, at worst, moderately congested. This flow of traffic would not interfere with the speed or reliability of bus operations in the DAAR. When traffic flow on the DAAR degrades, the Metropolitan Washington Airports Authority (MWAA) plans to build this additional lane for all airport traffic.

Current express bus operations in the corridor and planned enhancements are part of the phased implementation program recommended in the MIS Supplement. These operations will be analyzed as an alternative to BRT as part of the Baseline Alternative.

### 2.6.3.2 Alignments

With the exception of the BRT alignment, most of the alignment alternatives under consideration were variations of the rail alignment recommended in the MIS. Each of the alignments eliminated during initial screening and discussed below were proposed rail alignments.

#### Route 7 Connection (T7)

Alignment T7 was a connection from the Orange Line through Tysons Corner via Route 7. This alignment was eliminated from further consideration because it would not serve the eastern part of the Tysons Corner area as effectively as other proposed alternatives.

#### DAAR Alternative with a Feeder System (T8)

Alignment T8 consisted of a rail station in the DAAR near Spring Hill Road that connected to a feeder system to serve Tysons Corner. This alignment was examined during the MIS and was eliminated from further consideration because ridership would be lower due to the forced transfer between Metrorail and the feeder system. In addition, it was determined that this alternative might have impacts on residences and historic resources near the Spring Hill Road Station. The MIS assumptions were examined and verified during initial screening.

#### Partial Double-Track Loop (T10)

This alignment consisted of an aerial loop in Tysons Corner following Route 123, Route 7, and Westpark Drive with a double-track configuration on the southern leg of the loop. It was determined that T10 could provide operational flexibility in Tysons Corner; however, this flexibility could be provided through less costly options. The alternative was eliminated from further consideration because its additional costs and impacts would yield little or no additional benefit, particularly given that T10 was not likely to provide better service than the single-track loop configuration under consideration.

### Beltway Connection (B1 and T11)

Alignment B1 provided an Orange Line connection via the Capital Beltway, while Alignment T11 consisted of a large aerial loop that would include a station adjacent to the Capital Beltway. Alignment T11 could connect to Alignment B1, as well as a possible future transit line in the Beltway corridor.

Alignments B1 and T11 were eliminated from further consideration because they would have higher costs but not greater benefits than other proposed alternatives. Because of the planned widening of the Beltway, I-66, Route 7, and Route 123, implementation of Alignment B1 would require significant right-of-way acquisition at substantial cost. In addition, the larger loop of Alignment T11 would provide inferior service coverage compared to other loop alternatives and would be more costly than the smaller loop.

### Alignment D2

Alignment D2 would provide direct service to Reston Town Center via the Washington & Old Dominion (W&OD) Railroad Regional Park, in lieu of the indirect service provided by an alignment in the DAAR median. Alignment D2 is not consistent with existing land use, nor is it consistent with local or regional land use plans. Development of Alignment D2 would not preclude other planned improvements from occurring, but it would preclude the continued use of the W&OD Railroad Regional Park in certain areas because parkland would be converted for permanent use as a rail line. Because the DAAR median alignment is a prudent and feasible alternative to the use of this parkland, and would not have impacts on the park, Alignment D2 was eliminated from further consideration, consistent with Section 4(f) of the U.S. Department of Transportation Act of 1966.

### Alignment S1

Several alignments suggested during the scoping process involved connections to transit improvements in the corridor that are either currently under study or are identified in long-range plans. Alignment S1 combined the proposed Dulles Corridor alignment with two other rail alignments: one an Orange Line extension in the I-66 corridor that is currently under study as a separate project, and the other a proposed rail line along the Route 28 and Route 50 corridors. This large loop alignment was eliminated from further consideration because it was inconsistent with federal guidelines for defining the scope of a project for evaluation in an EIS. The guidelines state that a proposed project should have logical endpoints and should be usable as an independent improvement, even if additional transportation improvements in the area are not made. The various segments of Alignment S1 would each have logical endpoints and would function as independent improvements if the other segments were not developed. Therefore, each should be studied as a separate project.

### 2.6.3.3 Stations

Stations that were located only on alignments that were eliminated from further consideration were also eliminated. For example, because Alignment D2 was eliminated from further consideration, stations proposed along the former W&OD right-of-way at Wiehle Avenue and Reston Town Center were also eliminated. Summarized below is the initial screening analysis for eliminated station alternatives that were not alignment-specific. These alternatives include the addition of stations and the removal of proposed stations.

### Addition of Hunter Mill Road Station

The proposed Hunter Mill Road Station was eliminated from further consideration because the station is not consistent with current or planned land use in the vicinity. Low-density land uses surrounding the proposed site would not generate enough ridership to support a station at this location. In addition, the citizens in the area have expressed strong opposition to a station at Hunter Mill Road.

The Dulles Corridor Land Use Task Force, appointed by the Fairfax County Board of Supervisors, stated strong opposition to a station at Hunter Mill Road in lieu of the proposed station at Wiehle Avenue. The Task Force voted at its session on February 26, 2001 to endorse the elimination of the Hunter Mill station and continued planning for the Wiehle Avenue station. The Comprehensive Plan changes adopted by the Fairfax County Board of Supervisors on May 21, 2001 support this position; no transit-oriented land use plans have been adopted or considered for a proposed station in the vicinity of Hunter Mill Road.

#### Removal of Wiehle Avenue Station

Though it was suggested during scoping that the proposed Wiehle Avenue Station be eliminated from the project, this station was retained for further analysis based on the current and planned uses for the area surrounding the proposed station location. These uses generate demand that cannot be adequately served by the Reston Parkway Station. As described above, the Dulles Corridor Land Use Task Force endorsed the continued consideration of the Wiehle Avenue Station.

### 2.6.3.4 Ancillary Facilities

During initial screening, 13 potential sites were examined for the BRT Maintenance and Storage Facility and the Metrorail Service and Inspection Yard (S&I Yard) as shown in Figure 2.6-4. Four sites were recommended during the MIS and additional sites were identified during agency coordination for the Draft EIS.

Nine of the proposed sites were eliminated during initial screening because they were inconsistent with local land use plans and zoning designations or because they contained or were crossed by important water resources in Loudoun County. For instance, sites located in areas consisting of, or zoned for, residential development or mixed-use and office park development were eliminated because these uses were not considered consistent with a transit system maintenance and storage facility. In addition, sites that crossed or were located near Broad Run and Horsepen Run (two streams in Loudoun County) were eliminated from further consideration.

Other ancillary facilities, such as traction power substations and tie-breaker stations, were not evaluated during initial screening because siting of these facilities was not complete at that time.

## 2.6.4 INTERMEDIATE SCREENING

The alternatives carried forward from initial screening were subjected to a more rigorous evaluation in intermediate screening. In this phase of evaluation, many of the criteria applied during initial screening were measured more quantitatively. For instance, the initial screening only considered the number of trip generators or the amount of employment within walking distance of a station to determine an alternative's ridership potential, whereas the intermediate screening used output from the travel demand model to generate preliminary ridership estimates for the remaining alternatives. Project staff also developed preliminary capital costs for the alternatives based on standard costs for various project elements.

Alternatives that were eliminated during intermediate screening and the reasons they were not carried forward for full evaluation in the Draft EIS are discussed in the following sections.

### 2.6.4.1 Alignments

Alignments eliminated during intermediate screening were proposed rail alignment alternatives.

### Orange Line Connection (O2)

Evaluation of the Orange Line Connection focused on the relative costs and benefits of a western leg that would allow trains from the Dulles Corridor to continue directly to the western end of the Orange Line. The configuration with the western leg, called Alignment O2, was a design variation of Alignment O1, the MIS configuration for connecting to the Orange Line. Alignment O1 is the basic configuration required to allow trains from the Dulles Corridor line to connect to the rest of the Metrorail system, but would require a transfer for passengers traveling west on the Orange Line.

The intermediate screening evaluation showed that Alignment O2 would cost nearly twice as much as Alignment O1, but the expected increase in ridership for Alignment O2 was negligible. In addition, Alignment O2 was expected to have greater impacts on adjacent communities. Because the higher costs and impacts associated with Alignment O2 would not be warranted by the small expected increase in ridership, it was eliminated from further consideration.

Should the Orange Line be extended to Centreville in the future, travelers from the western portions of the region would be able to access the Orange Line closer to their homes and avoid traffic congestion en route to Vienna. Riders from these areas may create demand for a direct connection between the Dulles Corridor and the western end of the Orange Line. Accordingly, the design of Alignment O1 does not preclude future development of a western connection to the Orange Line.

### Loop Alignment and Variations (T2 and T5)

Three variations of the loop alignment for serving Tysons Corner were carried forward from initial screening. These alignments were evaluated relative to one another during intermediate screening, and it was determined that two of the loops would have substantial costs and impacts.

Due to the inclusion of loop connectors, Alignment T2 would have greater potential for visual and noise impacts on adjacent residential communities than Alignment T4 (a similar alignment without the loop connectors). Alignment T2 would also have operational difficulties, and higher capital, operating, and maintenance costs than Alignment T4, but would only provide modest ridership benefits. Alignment T5 would avoid many of the impacts of Alignments T2 and T4, but would have much higher costs than these alignments, as well as additional risks associated with underground construction. While Alignment T4 would not be without impacts, it would not have the severity of impacts or the costs associated with Alignment T2, nor would it have the capital cost and level of risk associated with Alignment T5.

Based on these findings, Alignments T2 and T5 were eliminated from further consideration.

### Connections to Future Transit Improvements (T3)

During initial screening, study of Alignment T3 was suspended until additional information was available regarding possible modes and alignments for a future rail line in the Capital Beltway Corridor.

The *Capital Beltway Corridor Rail Feasibility Study*, released in March 2001, included recommendations for three different modes, each with a different alignment and station locations. The current Beltway rail plans are not yet developed to a level that would make it appropriate or feasible to conduct detailed coordination efforts related to those improvements. Therefore, Alignment T3 was eliminated from further consideration, as they would not be developed in a time frame consistent with the schedule for the Dulles Corridor Rapid Transit Project.

As work progresses on a future Capital Beltway rail line, the Dulles Corridor Rapid Transit Project team will cooperate with the groups implementing that project and coordinate with them to the extent feasible regarding a connection between the two transit systems.

#### 2.6.4.2 Stations

##### Tysons Central Station

During initial screening, the possibility of shifting the Tysons Central Station farther to the east for Alignment T1 was carried forward for additional analysis. In intermediate screening, it was determined that the more easterly station location (Tysons Central Alternative Station) would be less costly and would likely have more benefits than the original Tysons Central Station location. Tysons Central Alternative Station would have better connections to existing employment concentrations and to proposed office developments. It also has higher potential for joint development at sites that are currently undeveloped or underdeveloped. Therefore, the original Tysons Central Station was eliminated from further consideration in favor of the alternative location.

##### Wolf Trap Farm Park Station

Based on coordination with the National Park Service (NPS) and the Wolf Trap Foundation (a non-profit organization associated with the park), it was determined that a station at Wolf Trap would not be constructed as part of the Dulles Corridor Rapid Transit Project. The project would include provisions to accommodate a future Wolf Trap station, but the station itself and its access facilities were eliminated from further consideration. Only the provisions required to accommodate the future station were fully evaluated in the Draft EIS. Should funding for a station be identified in the future, a separate environmental review process would be required to fully evaluate the proposed station.

##### Relocation of the Wiehle Avenue and Reston Parkway Stations Under or Near the Highway Overpasses

The project team proposed that the Wiehle Avenue and Reston Parkway stations be located in the median of the DAAR west of their corresponding highway overpasses at places where the Dulles Toll Road has been realigned to accommodate transit stations in the DAAR median. During the public scoping process, it was suggested that the stations be relocated under the highway overpasses to provide better access to all four quadrants of the interchanges at Wiehle Avenue and Reston Parkway. The feasibility of this relocation was examined during initial screening. It was determined that moving the stations would be costly and have substantial impacts, but additional analysis was recommended because the benefits of the relocation were not known at that time.

Following the initial analysis, stakeholders suggested that the project team should examine the feasibility of moving the stations closer to the overpasses, rather than directly under them. The stakeholders also encouraged the provision of station access from all four interchange quadrants. This option and the options originally assessed during initial screening were examined during intermediate screening.

In this second analysis, it was determined that moving the stations from the locations where the Toll Road was realigned would increase costs and impacts but would offer no significant benefits. For the central portion of the corridor, Fairfax County has amended their Comprehensive Plan to allow increased densities within the vicinity of transit stations. Because any proposed land use density bonuses would move with the stations (as discussed in the May 2001 recommendations of the Dulles Corridor Land Use Task Force), relocating the

stations nearer to or under the overpasses and providing access to all four quadrants of the interchange would not increase ridership potential above that for the stations at the locations where the Toll Road was realigned.

Placing the stations under the overpasses would also generate several safety concerns, including narrow shoulder widths and station security issues. These issues would necessitate rebuilding the DAAR, the Toll Road, the highway overpasses, and the interchange ramps to accommodate the stations under the overpasses. The result would be substantial cost increases, a lengthier construction period, traffic delays, and extensive impacts on people living and working in the corridor, particularly in Reston.

Similarly, moving the stations closer to the overpasses, as proposed by stakeholders, would necessitate rebuilding the highway overpasses because the proposed design would undermine the pier footings supporting the bridges. It is also possible that shoulder width considerations for this configuration could require rebuilding the DAAR, the Toll Road, and the interchange ramps.

Given these findings, such relocations of the Wiehle Avenue and Reston Parkway stations were eliminated from further consideration.

#### Accommodation of Route 28 Light Rail Transit

Accommodation of Route 28 light rail transit (LRT) was evaluated with currently available information about potential transit improvements in the Route 28 corridor. Several studies have recommended future development of light rail transit in the Route 28 corridor, including recent proposals by the area's transportation management agency (TMA) that would bring the alignment very near to the proposed Route 28 Station for the Dulles Corridor Rapid Transit Project. However, a Route 28 LRT system is not currently included in the Virginia Transportation Development Plan, indicating that, while transit improvements have been identified as desirable in the Route 28 corridor, no Route 28 transit study is currently being conducted nor is one currently planned by the Commonwealth.

Because plans for a Route 28 LRT system have not been developed to a level that would make it appropriate or feasible to conduct detailed coordination efforts related to those improvements, accommodation of a Route 28 LRT system has been eliminated from further consideration.

### 2.6.4.3 Ancillary Facilities

Four proposed sites for a BRT Maintenance and Storage Facility and a Metrorail Storage and Inspection (S&I) Yard were carried forward for further evaluation in intermediate screening. They include three sites near the Route 606 interchange with the Dulles Greenway (Sites 6, 7, and 10) and one site at the south end of Dulles Airport property near the new Smithsonian National Air and Space Museum Annex (Site 13). During intermediate screening, the project team determined that each site would have the potential for the following impacts:

- Steep slopes, floodplains, and wetlands restrict the suitability of Site 6.
- Locating a maintenance and storage facility on Site 10 would require extensive property acquisition, including a historic property, from the federal government and from private properties housing existing business operations.
- Site 13 is inconsistent with the approved Airport Layout Plan for Dulles Airport and, like Site 6, may have environmental resources that could be affected by a rail yard. Furthermore, locating a yard on

Site 13 would result in significantly higher capital and operating costs due to the required length of the yard lead.

- Although Site 7 also contains floodplains and wetlands that could be affected by a maintenance and storage facility, the relatively large size of the site allows a configuration that would minimize these impacts. In addition, Site 7 has a more optimal end-of-the-line location than Site 13 and it is closer to the mainline tracks.

Based on these findings, Sites 6, 10, and 13 were eliminated from further consideration.

Initially, Site 7 was carried forward as the site for both the BRT Maintenance and Storage Facility and the Metrorail S&I Yard. Following the publication of the *Final Alternatives Analysis Report*, MWAA made a parcel of land on the northern part of the Dulles Airport property available for use as the BRT Maintenance and Storage Facility. This new site, Site 14, was screened using the same criteria applied to potential yard sites during initial and intermediate screening. It was determined that though the site has some floodplain and wetland restrictions, it is consistent with local zoning designations and the Airport Layout Plan. Moving the BRT Maintenance and Storage Facility from Site 7 to Site 14 would also allow the S&I Yard at Site 7 to be reconfigured to further minimize environmental impacts at that site. Therefore, Site 7 was eliminated from further consideration as the site for the BRT Maintenance and Storage Facility.

### 2.6.5 SUPPLEMENTAL RAIL YARD STUDY

In November 2001, the Steering Committee for the Dulles Corridor Rapid Transit Project asked DRPT and WMATA to consider alternative yard sites to Site 7. In response, the project team initiated a Supplemental Rail Yard Study to examine different end-of-line locations for a Metrorail S&I Yard. Sites were also assessed to determine the feasibility of collocating the BRT Maintenance and Storage Facility with the S&I Yard.

As shown in Figure 2.6-5, seven supplemental yard sites were investigated during the study, all of which were located in Loudoun County. Four of the sites were located on Dulles Airport property. All sites were evaluated using the same screening process applied to the Initial NEPA Alternatives. For initial screening, the supplemental sites were assessed at a lower level of detail against the same social, environmental, economic, and transportation criteria used during the previous alternatives analysis. Five sites were eliminated based on environmental constraints, inconsistencies with land use plans, or operational constraints.

- Use of two of the sites would result in impacts on the Horsepen Run wetlands system—an important water resource in Loudoun County.
- For two other sites, the existing and planned land uses would be inconsistent with a BRT Maintenance and Storage Facility and/or an S&I Yard.
- A fifth site would be inconsistent with WMATA design and operational requirements.

Because only two sites remained following the initial screening, the project team agreed that intermediate screening was not necessary. Both the remaining sites, Site 15 and Site 20, were carried forward for detailed evaluation in the Draft EIS.

## 2.7 SUMMARY OF ALTERNATIVES

This section includes a brief summary of the alternatives for the Dulles Corridor Rapid Transit Project and their anticipated effects. The alternatives that were evaluated for this Draft EIS are:

- Baseline Alternative;
- BRT Alternative;
- Metrorail Alternative;
- BRT/Metrorail Alternative; and
- Phased Implementation Alternative

The Baseline Alternative includes all existing highway and transit infrastructure and services in the Dulles Corridor, and, aside from the later phases of the Dulles Corridor Rapid Transit Project, all planned improvements through 2025 that are included in the region's 2000 CLRP. In addition, this alternative includes improvements to the existing Metrorail system needed to meet passenger demand through 2025.

The key features of each Build Alternative are summarized in Tables 2.7-1 and 2.7-3. Additional information on the station types for each alternative is provided in Table 2.7-2.

The anticipated effects of all alternatives under consideration for the Dulles Corridor Rapid Transit Project are summarized in Table 2.7-4. These effects and proposed mitigation, where necessary, are discussed in detail in Chapters 3 through 9.


Figure 2.6-5

## Supplemental Rail Yard Study Sites

Dulles Corridor
Rapid Transit Project

**Table 2.7-1: Summary of BRT, BRT/Metrorail, and Metrorail Alternatives**

| BRT Alternative | BRT/Metrorail Alternative | Metrorail Alternative |
|---|---|---|
| **Alignment** | | |
| ▪ Travel lanes of the Dulles Connector Road, Dulles Toll Road, DAAR, Dulles Greenway<br>▪ Buses would travel in mixed traffic, except on eastbound Connector Road and in places where some routes would use HOV lanes of Dulles Toll Road<br>▪ Serve Dulles Airport via airport service roads | ▪ Median of I-66, Dulles Connector Road, DAAR, and Dulles Greenway<br>▪ Four Metrorail configurations in core of Tysons Corner *(all aerial, or aerial/ underground)*<br>▪ Buses would travel in mixed traffic, except in places where some routes would use HOV lanes of Dulles Toll Road<br>▪ Serve Dulles Airport via airport service roads | ▪ Median of I-66, Dulles Connector Road, DAAR, Dulles Greenway<br>▪ Four Metrorail configurations in core of Tysons Corner *(all aerial, or aerial/ underground)*<br>▪ Serve Dulles Airport via an underground alignment |
| **Stations/Stops** | | |
| Modifications to West Falls Church Station Northside bus facility<br>BRT 1: 5 BRT stations, 3 BRT stops<br>BRT 2: 3 BRT stations, 4 BRT stops<br>BRT 3: 1 BRT bi-level station, 6 BRT stops | 3 to 6 rail stations *(all aerial or one underground)*<br>BRT/Metrorail Transfer at Tysons West Station<br>BRT 1: 4 BRT stations, 3 BRT stops<br>BRT 2: 3 BRT stations, 3 BRT stops<br>BRT 3: 1 BRT bi-level station, 5 BRT stops | 10 to 13 rail stations *(3 to 6 aerial, 6 at-grade, 1 to 2 underground)*<br>Provisions for future Wolf Trap station |
| **Maintenance and Storage Facility** | | |
| BRT Maintenance and Storage Facility | BRT Maintenance and Storage Facility<br><br>Additional storage tracks and new yard lead at West Falls Church Yard | Metrorail S&I Yard<br>*(Three possible sites)*<br>Additional storage tracks and new yard lead at West Falls Church Yard |
| **Range of Capital Costs (Year of Expenditure Dollars)** | | |
| $ 342.7 – 481.4 million | $ 1,303.1 – 1,454.1 million | $ 2,937.3 – 3,101.3 million |
| **Operating Characteristics** | | |
| BRT Service<br>Feeder/Corridor Service<br><br>Peak Headways in Corridor<br>BRT ≈ 6 min | BRT Service<br>Metrorail Service<br>Feeder/Corridor Service<br>Peak Headways in Corridor<br>BRT ≈ 6 min<br>Metrorail = 6 min | Metrorail Service<br>Feeder/Corridor Service<br><br>Peak Headways in Corridor<br>Metrorail = 6 min |
| **Range of Incremental Annual O&M Costs – Opening Year Estimates (Year of Expenditure Dollars)** | | |
| $ 20.7 – 26.8 million | $ 52.9 – 57.1 million | $ 106.7 – 110.8 million |

**Table 2.7-2: Station Configuration by Alternative***

| Station | BRT Alternative | BRT/Metrorail Alternative | Metrorail Alternative |
|---|---|---|---|
| West Falls Church | BRT Terminal; intermodal transfer to existing Orange Line Station | Not used by Dulles Corridor Rapid Transit Project | Not used by Dulles Corridor Rapid Transit Project |
| Tysons East | n.a. | Metrorail station | Metrorail station |
| Tysons Alternatives (Tysons Central A, B, C, and D) | n.a. | Metrorail stations | Metrorail stations |
| Spring Hill Road/<br>Tysons-West*Park | BRT 1: BRT station<br>BRT 2: BRT stop<br>BRT 3: BRT stop | n.a. | n.a. |
| Tysons West | n.a. | Intermodal transfer from BRT to Metrorail | Metrorail station |
| Wiehle Avenue | BRT 1: BRT station<br>BRT 2: BRT station<br>BRT 3: BRT stop | BRT 1: BRT station<br>BRT 2: BRT station<br>BRT 3: BRT stop | Metrorail station |
| Reston Parkway | BRT 1: BRT station<br>BRT 2: BRT station<br>BRT 3: Bi-Level BRT station | BRT 1: BRT station<br>BRT 2: BRT station<br>BRT 3: Bi-Level BRT station | Metrorail station |
| Herndon-Monroe | BRT 1: BRT station<br>BRT 2: BRT station<br>BRT 3: BRT stop | BRT 1: BRT station<br>BRT 2: BRT station<br>BRT 3: BRT stop | Metrorail station |
| Route 28 | BRT 1: BRT station<br>BRT 2: n.a.<br>BRT 3: n.a. | BRT 1: BRT station<br>BRT 2: n.a.<br>BRT 3: n.a. | Metrorail station |
| Dulles Airport | BRT stop | BRT stop | Metrorail station |
| Route 606 | BRT stop | BRT stop | Metrorail station |
| Route 772 | BRT stop | BRT stop | Metrorail station |

* Stations for the BRT Alternative correspond to the BRT phase of the Phased Implementation Alternative. Similarly, the stations for the BRT/Metrorail and Metrorail alternatives correspond to the Metrorail through Tysons Corner and Metrorail to Loudoun County phases, respectively.

n.a. = not applicable

**Table 2.7-3: Summary of Phased Implementation Alternative**

| BRT Phase | Metrorail through Tysons Corner Phase | Metrorail to Loudoun County Phase |
|---|---|---|
| **Previous Studies** | | |
| Same as Phase III from MIS Supplement<br>*(with addition of Route 28 BRT Station)* | Same as Phase IV-A from MIS Supplement<br>*(with additional rail configurations in Tysons Corner)* | Same as Phase IV-B from MIS Supplement<br>*(with additional rail configurations in Tysons Corner)* |
| **Alignment** | | |
| Same as BRT Alternative | Same as BRT/Metrorail Alternative | Same as Metrorail Alternative |
| **Stations/Stops** | | |
| Same as BRT Alternative | Same as BRT/Metrorail Alternative | Same as Metrorail Alternative |
| **Station Conversion** | | |
| Not applicable | BRT 1: Remove BRT station in Tysons Corner<br>BRT 2: Remove BRT stop in Tysons Corner<br>BRT 3: Remove BRT stop in Tysons Corner<br>Add ramps from DAAR to Tysons West Station | BRT 1:<br>▪ Convert 4 BRT stations to Metrorail<br>▪ Convert 2 BRT stops to Metrorail; replace 1 BRT stop with Metrorail<br>BRT 2:<br>▪ Convert 3 BRT stations to Metrorail; add 1 Metrorail station<br>▪ Convert 2 BRT stops to Metrorail; replace 1 BRT stop with Metrorail<br>BRT 3:<br>▪ Convert 4 BRT stops to Metrorail; replace 1 BRT stop with Metrorail<br>▪ Add 1 Metrorail station<br>Remove ramps to Tysons West Station or convert for other uses |
| **Maintenance and Storage Facility** | | |
| BRT Maintenance and Storage Facility<br>*(Two possible sites; selection depends on S&I Yard site selection)* | Add new storage tracks and new yard lead at West Falls Church Yard | Add new Metrorail S&I Yard<br>*(Three possible sites; at one site, S&I Yard could be collocated with BRT Maintenance and Storage Facility)* |
| **Incremental Capital Costs for Each Phase Excluding Financing (Year of Expenditure Dollars)** | | |
| $ 481.4 million (BRT 1) | $ 1,050.4 million (T6) | $ 1,763.8 million (T6)<br>*Total Capital Cost for All Phases (BRT 1 to T6):*<br>$ 3,295.4 million |
| **Operating Characteristics** | | |
| Same as BRT Alternative<br>During construction of next phase, minor effects on BRT 2 and 3 operations in Tysons Corner. | Initially same as BRT/Metrorail Alternative<br>During conversion for next phase, BRT 1 or 2 median operations displaced. Alternative service from station facilities north and south of Dulles Toll Road. No effect on BRT 3 operations. | Same as Metrorail Alternative |
| **Range of Annual O&M Costs – Opening Year Estimates (Year of Expenditure Dollars)** | | |
| $ 20.7 million (BRT 1) | $ 52.9 – 57.1 million | $ 106.7 – 110.8 million |

**Table 2.7-4: Summary of Effects**

| Measures of Effectiveness | Alternatives | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline | BRT | | | Metrorail | | | | BRT/Metrorail | Phased Implementation |
| | | BRT 1 | BRT 2 | BRT 3 | T1 | T6 | T9 | T4 | | |
| **Transit Operations** | | | | | | | | | | |
| Opening Year Ridership[1] | – | 30,300 | 30,100 | 26,900 | 71,300 | 71,900 | 71,900 | 69,400 | 50,800 (BRT 1/T4) | 26,900 - 30,300 |
| Opening Year New Riders[1] | – | 4,500 | 4,400 | 2,200 | 31,600 | 32,700 | 32,700 | 31,400 | 18,800 | 2,200 - 4,500 |
| Forecast Year Ridership (2025)[1] | – | 49,400 | 48,000 | 47,100 | 86,300 | 86,900 | 86,900 | 83,800 | 70,500 | 83,800 - 86,900 |
| Forecast Year New Riders (2025)[1] | – | 12,500 | 11,400 | 10,900 | 37,300 | 38,300 | 38,300 | 36,800 | 25,100 | 36,800 - 38,300 |
| Peak Period Headways (2025) | 5 - 30 min. | 6 - 12 min. | 4 - 24 min. | 4 - 24 min. | 6 min. | 6 min. | 6 min. | 6 min. | 6 min. Metrorail<br>4 - 24 min. BRT | 6 min. |
| Non-Peak Period Headways (2025) | 30 - 60 min. | 12 min. | 12 - 24 min. | 12 - 24 min. | 12 min. | 12 min. | 12 min. | 12 min. | 12 min. | 12 min. |
| Percent Increase in Passenger Throughput on Dulles Toll Road at Wiehle Avenue in a.m. peak (Over Baseline in 2025)[2] | – | 10% | 10% | 10% | 60% | 60% | 60% | 60% | 10% | 60% |
| **Costs[3]** | | | | | | | | | | |
| Capital Costs (by Year of Expenditure) | – | $481.4M | $349.1M | $342.7M | $2,937.3M | $3,101.3M | $2,982.6M | $3,080.4M | $1,454.1M<br>(BRT1/T6) | $3,295.4M<br>(BRT1/T6) |
| Capital Funding Sources[4] | – | 60% Federal<br>40% Local | 60% Federal<br>40% Local | 60% Federal<br>40% Local | 50% Federal<br>50% Local | 50% Federal<br>50% Local | 50% Federal<br>50% Local | 50% Federal<br>50% Local | 52.9% Federal<br>47.1% Local | 51.5% Federal<br>48.5% Local |
| Average Annual O&M Costs (by Year of Expenditure 2025) | $510.7M | $54.1M | $55.0M | $64.2M | $176.5M | $179.4M | $180.4M | $184.2M | $107.2 - $114.9M | $176.5 - $184.2M |
| **Social Effects** | | | | | | | | | | |
| Consistent with Local Comprehensive Plans | No | Yes | No | No | Yes | Yes | Yes | Yes | Yes for BRT 1 | Yes for BRT 1 |
| Residential Displacements (No.) | – | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Commercial Displacements (No.) | – | 0 -2 | 0 - 2 | 0 - 2 | 2 | 3 | 6 | 5 | 2 - 8 | 2 - 8 |
| Residential Properties Acquired (No.) | – | 0 | 0 | 0 | 9 Partial | 9 Partial | 9 Partial | 9 Partial | 0 | 9 Partial |
| Commercial Properties Acquired (No.) | – | 14 | 8 | 4 | 57 | 62 | 65 | 81 | 47 - 70 | 60 - 84 |
| Visual Effects | – | Minor | Minor | Moderate | Moderate - Substantial | Moderate - Substantial | Moderate - Substantial | Moderate - Substantial | Moderate - Substantial | Moderate - Substantial |

**Table 2.7-4: Summary of Effects (continued)**

| Measures of Effectiveness | Alternatives | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline | BRT | | | Metrorail | | | | BRT/Metrorail | Phased Implementation |
| | | BRT 1 | BRT 2 | BRT 3 | T1 | T6 | T9 | T4 | | |
| Effects on Archaeological Sites[5] | – | None | None | None | 4 Potential Effects | 4 Potential Effects | 4 Potential Effects | 4 Potential Effects | 1 Potential Effect | 4 Potential Effects |
| Effects on Historic Architectural Properties | – | No Adverse Effect (3) | No Adverse Effect (3) | No Adverse Effect (4) | No Adverse Effect (3) | No Adverse Effect (3) | No Adverse Effect (3) | No Adverse Effect (3) | No Adverse Effect (3) | No Adverse Effect (3) |
| Effect on Public Parklands | – | Minor (2) | Minor (2) | Minor (2) | Minor (7) | Minor (7) | Minor (7) | Minor (7) | Minor (6) | Minor (6) |
| Disproportionate Impacts to Minority/Low Income Pops. | – | None | None | None | None | None | None | None | None | None |
| Environmental Effects | | | | | | | | | | |
| Effect on Geologic Resources | – | Minor | Minor | Minor | Minor | Minor | Minor | Minor | Minor | Minor |
| Streams/Water Quality Impacts (Linear Feet) | – | 96 | 96 | 96 | 176 | 176 | 176 | 176 | 96 | 176 |
| Wetland Impact (Acres)[6] | – | 0.12 - 0.58 | 0.12 - 0.58 | 0.12 - 0.58 | 0.12 - 1.22 | 0.12 - 1.22 | 0.12 - 1.22 | 0.12 - 1.22 | 0.12 - 0.58 | 0.12 - 1.22 |
| Floodplain Impacts | – | 2 | 2 | 2 | 6 | 6 | 6 | 6 | 4 | 6 |
| Effects to Habitat and Biota | – | Minor - Moderate | Minor - Moderate | Minor - Moderate | Minor - Moderate | Minor - Moderate | Minor - Moderate | Minor - Moderate | Minor - Moderate | Minor - Moderate |
| Effects on Rare, Threatened, and Endangered Species | – | None | None | None | Minimal | Minimal | Minimal | Minimal | Minimal | Minimal |
| Air Quality (2025) | Improved | Improved | Improved | Improved | Improved | Improved | Improved | Improved | Improved | Improved |
| Noise Impacts Before Mitigation (No. of Receptors above FTA Criteria 2025) | – | 77 | 65 | 81 | 120 | 119 | 112 | 117 | 104 - 114 | 112 - 120 |
| Neighborhoods Affected by Noise Before Mitigation (No. above FTA Criteria) | – | 6 | 6 | 6 | 12 | 12 | 12 | 15 | 12 | 12 - 15 |
| Vibration Impacts (No. Locations) | – | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Groundborne Noise Levels Above Criteria (No. Residences) | – | 0 | 0 | 0 | 9 | 9 | 9 | 9 | 9 | 9 |
| Hazardous Materials Sites Potentially Affected | – | 3 | 3 | 3 | 22 - 28 | 22 - 28 | 22 - 28 | 22 - 28 | 25 - 31 | 25 - 31 |
| Energy Usage (Percent change from Baseline) | – | -0.06% | -0.06% | -0.06% | -0.09% | -0.09% | -0.09% | -0.09% | 0.53% | -0.09% |

**Table 2.7-4: Summary of Effects (continued)**

| Measures of Effectiveness | Alternatives | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline | BRT | | | Metrorail | | | | BRT/Metrorail | Phased Implementation |
| | | BRT 1 | BRT 2 | BRT 3 | T1 | T6 | T9 | T4 | | |
| Economic Effects | | | | | | | | | | |
| Total Transit Employees | 8,990 | 9,330 | 9,330 | 9,330 | 9,591 | 9,591 | 9,591 | 9,591 | 9,498 | 9,591 |
| Annual Tax Revenue Loss due to Property Acquisition (2001 Dollars) | – | $0.45M | $0.45M | $0.45M | $1.42M | $1.42M | $1.42M | $1.42M | $1.28M | $1.42M |
| Corridor Population (2025)[7] | 339,497 | +24,496 | +15,984 | +7,399 | +31,879 | +35,976 | +35,976 | +38,390 | +26,872 - 33,383 | +31,879 - 38,390 |
| Corridor Employment (2025)[7] | 403,857 | +26,756 | +7,972 | +2,474 | +60,554 | +62,723 | +62,723 | +65,470 | +52,331 - 57,247 | +60,554 - 65,470 |
| Corridor Development in 2025 (Million square feet)[7] | 304.63 | +23.07 | +12.68 | +6.26 | +37.58 | +40.52 | +40.52 | +42.69 | +33.19 - 38.31 | +37.58 - 42.69 |
| Traffic Effects | | | | | | | | | | |
| Number of Intersections at LOS F - a.m. | 21 | 10 | See Note 9 | 11 | See Note 9 | 21 | See Note 9 | See Note 9 | 22 | 21 |
| Number of Intersections at LOS F - p.m. | 18 | 8 | See Note 9 | 9 | See Note 9 | 20 | See Note 9 | See Note 9 | 20 | 20 |
| Section 4(f) and Section 6(f) Resources | | | | | | | | | | |
| Use of Section 4(f) Resources | – | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Use of Section 6(f) Resources | – | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Secondary and Cumulative Effects | | | | | | | | | | |
| Potential for Effects Related to Secondary Development | – | Low | Low | Low | Moderate | Moderate | Moderate | Moderate | Low | Moderate |
| Contribution of Project to Cumulative Effects | – | Low | Low | Low | Low | Low | Low | Low | Low | Low |

1 Average weekday riders.
2 Percent increase in a.m. peak n the eastbound direction at Wiehle Avenue.
3 "M" - Millions.
4 Local refers to monies that would come from local jurisdictions as well as the Commonwealth of Virginia.
5 Likely that resources destroyed by previous construction. Potential effects if resources remain.
6 All alternatives would impact 0.12 acres. An additional 0.46 acres would be impacted if Route 772 Station-North Option is selected, and an additional 0.64 acres if Yard 15 is selected.
7 Changes in population, employment, and development potential calculated for areas within 1/2 mile radius of proposed stations except in Tysons Corner, where a 1,600-foot radius was used. Changes added to totals for all TAZs in corridor.
8 LOS - Level of Service; Measure of performance of intersections: A being the best and F being the worst.
9 Analysis not completed for this alignment. Traffic impact analysis completed for worst-case alignment options (BRT 1, BRT 3, and T6).

# Social Effects 3

# 3 SOCIAL EFFECTS

This chapter provides a general description of the existing population, and the living and working environments of people in the study area. The social aspects and built environment of the Dulles Corridor were studied in detail, and the project's Baseline and the four Build Alternatives were analyzed to identify and assess the potential effects of each on the study area's population, housing, places of employment, land use, neighborhoods, and community services and facilities.

Each of the sections in this chapter defines a study area, the methods used to make the assessments, and the existing conditions of each area, facility, or population. Study area definitions vary according to the topic being studied. For topics such as displacements and relocations, the study area is the limit of disturbance for the proposed improvements. For other topics, the study area differs from the limit of disturbance. For example, with visual effects, extent of the study area changes along the corridor depending on the types of views and viewers present and the locations of those viewers.

Each alternative is evaluated below in terms of potential long-term, and construction (short-term), effects and, when appropriate, measures to mitigate effects are recommended. The following topics are discussed:

**Section 3.1 Land Use.** Existing and future land uses are described in this section. Regional, county, and local land use characteristics are presented, and regulations and county plans are described. In addition, projections of population, household, and employment growth due to land use changes in the corridor are assessed.

**Section 3.2 Neighborhoods, Community Services, and Community Cohesion.** This section contains a description of each neighborhood in the study area and associated community facilities (schools, places of worship, and recreation areas).

**Section 3.3 Displacement and Relocation.** This section discusses the residential, commercial, and institutional properties that are likely to be displaced or relocated by construction of the proposed alternatives.

**Section 3.4 Visual and Aesthetic Conditions.** This section describes the existing views and aesthetic conditions in the corridor and the potential of the alternatives to affect the visual character of the corridor.

**Section 3.5 Cultural Resources.** This section documents the historic and archeological resources in the study area. The discussion includes regulations that govern cultural resources, an overview of the history of the study area, and the existing status of each resource. This section also presents the effects of each of the alternatives on the cultural resources and mitigation measures where they would be required.

**Section 3.6 Parklands and Recreation Areas.** This section describes and maps each of the publicly owned parklands and recreation areas in the study area, and assesses the potential effects of the proposed alternatives on these facilities. Where appropriate, mitigation measures are proposed.

**Section 3.7 Safety and Security.** This section describes the safety and security issues with the existing Metrorail system, and those that would be associated with the proposed alternatives to provide a safe and secure environment for transit patrons in the Dulles Corridor.

**Section 3.8 Environmental Justice.** To comply with Executive Order 12898, the presence of specific social groups, especially minorities, children, the elderly, and the poor, was ascertained in relation to each of the alternatives. This section describes the groups, their location relative to the alternatives, and the results of the analysis. Particular focus is placed on any minority or low-income group or neighborhood that would be disproportionately affected by the project.

## 3.1 LAND USE

This section discusses existing and planned land use, major development activities, and land use controls within the Dulles Corridor. It also addresses changes in land use that would result from the direct conversion of land within the corridor as well as changes in population, households, and employment that would occur in the corridor as land is developed. Changes in the corridor associated with increased densities or changes in the land use mix that are permitted under the *Fairfax County Comprehensive Plan* and the *Loudoun County Revised General Plan* if transit improvements are made are discussed in Chapter 5. Additional information regarding land use in the Dulles Corridor is provided in the *Land Use Technical Report* (June 2002).

As described in Chapter 1, population, housing, and employment in the Dulles Corridor are growing rapidly and development patterns are changing to accommodate this growth.

### 3.1.1 METHODOLOGY

Potential changes in land use were determined by interpreting aerial photographs and reviewing comprehensive plans. Land use data provided by Fairfax and Loudoun counties were incorporated into a Geographic Information System (GIS) database for the project and then field-verified.

The study area for this analysis was defined as land within 300 feet of either side of the centerline of the alternatives and within a half-mile radius of the proposed station areas. This area was selected based on review of the anticipated limit of disturbance of the proposed improvements and was determined to be large enough to capture the potential land use effects. Land use was assessed at the regional, county, and corridor level. The projections of land use changes included direct conversion of land for transit facilities. The process for identifying secondary development associated with the Build Alternatives within the half-mile station areas is described in Chapter 5.

The expected changes in population, households, and employment that would result from this secondary development are discussed below. It should be noted that the changes in population, households, and employment are projections, intended to be used in evaluating alternatives, dependent on implementation of the proposed project and a variety of other economic factors. In several cases the projections represent a substantial change in the level of development in close proximity to the transit station, as allowed by the *Fairfax County Comprehensive Plan* and the *Loudoun County Revised General Plan*. This level of development should be considered to be a preliminary estimate and as such may overstate the actual level of development in the future condition. The actual level of development will ultimately be determined by the local jurisdictions as they control all land use decisions.

Historic U.S. Census data, including data from Census 2000, were reviewed to obtain population and employment information. The Metropolitan Washington Council of Governments' (MWCOG) forecasts of growth in population, households, and employment Round 6.2 Forecasts (Round 6.2) were used to project growth through 2025. MWCOG is the Metropolitan Planning Organization (MPO) for the Washington, D.C. region.

Projections for the Baseline Alternative were drawn directly from Round 6.2 forecasts for 2025. To guide growth in their jurisdictions, Fairfax and Loudoun county officials have developed comprehensive plans that call for the implementation of rapid transit in the corridor and provide a guide for development around station areas. Projections for the Build Alternatives were based on triggers in each county's comprehensive plan that provide for increased density around transit stations depending on the mode implemented.

Real estate evaluations were made of the parcels located within the station areas designated to receive density bonuses. A density bonus is a mechanism allowed under the comprehensive plan and implemented through zoning ordinance that allows land to be developed at greater intensity if certain requirements are met. Development projections for each parcel were based on professional judgment, considering factors such as allowable density, parcel consolidation probabilities, and real estate market conditions. A variety of criteria were used to determine the level of development. These criteria included the size of the parcel under consideration, ownership, visibility, access to the site for vehicular and transit patronage, environmental constraints, location, and overall development characteristics of the area. Parcels containing recently constructed buildings or containing residential development were not considered as primary locations for development. Only development expected to occur as a direct result of changes in allowable density was included in the projections.

Population and employment projections were arrived at by applying standard conversion factors (persons/square foot of development) to the development projections. Actual population, household and employment growth may be higher or lower depending on a number of factors, including changes in economic conditions, changes in policy, or other market factors independent of the project.

An impact was deemed to occur if any of the alternatives would cause population or employment to be higher or in different geographic locations than those provided for by the counties in their comprehensive plans. The effects of any population and employment changes on adjacent communities are assessed in Chapter 9.

### 3.1.2 EXISTING CONDITIONS AND FUTURE PROJECTIONS

This section describes current land use, population, housing, and employment characteristics within the Dulles Corridor and is divided into regional- and corridor-level analyses. The regional-level discussion includes analyses for the Washington, D.C. metropolitan area and for Fairfax and Loudoun counties. The corridor-level analysis focuses on the various sections of the corridor.

#### 3.1.2.1 Regional Characteristics

Land use within the Washington metropolitan region follows the same pattern found in many major U.S. metropolitan areas. At the heart of the region is downtown Washington, D.C. Surrounding this urban core is a series of rings of suburban development, decreasing in density, surrounded by a series of outer suburbs that are rural in nature.

While every major classification of land use exists within the region, some characteristics are unique to certain areas. To meet its high employment and space requirements, near the nation's capital the federal government

has more land defined as government or publicly owned than most other regions. Although the majority of federally owned land lies within Washington, D.C., government uses have recently expanded into Arlington County, The City of Alexandria, and Fairfax County. Metrorail corridors, such as the Rosslyn-Ballston corridor into Arlington County, have extensive mixed-use land classifications. These mixed uses have developed over time as land around Metrorail stations has been developed according to local comprehensive plans that support increased densities and a unique mix of uses.

Activity centers are located throughout the Washington, D.C. metropolitan region. Major regional activity centers include the District of Columbia, Bethesda, Chevy Chase, and Silver Spring in Maryland; and Tysons Corner, Springfield, Centreville, and Reston in Virginia (along with several emerging centers such as Merrifield, Potomac Yard, and Ashburn). Each of these activity centers contains a mix of retail, office, industrial, commercial, and residential land uses that support major employment and residential bases. Several major regional activity centers are located within the Dulles Corridor.

MWCOG is responsible for maintaining and updating the regional population and employment model, which is used by the region for planning purposes. MWCOG has defined the region to include Washington, D.C., Montgomery, Prince George's, Arlington, Fairfax, Loudoun, Prince William, Frederick, Charles, Calvert, and Stafford counties; and the cities of Alexandria, Fairfax, Falls Church, Manassas, and Manassas Park (see Figure 3.1-1). This definition of the region and the MWCOG model projections are used throughout Chapter 3. Development in the region over the last 50 years has occurred along radial transportation corridors, such as I-270, I-95, I-66 and the Dulles Toll Road, and along the Capital Beltway. Activity centers, such as Tysons Corner and Springfield, have developed at major crossroads. As development along these corridors intensified, suburban development has spread to fill in the areas between these corridors.

As shown in Table 3.1-1, the region's population is expected to grow steadily through 2025, at an average of approximately 58,000 more persons per year. Population growth is expected to be spurred by the long-term strength of the region's economy, high rates of people moving into the region from other U.S. locations and international immigration, and less-rapid declines in average household size than were previously anticipated. The region's population that is 65 years of age and older will more than double between 2000 and 2025, while the number of children will increase by approximately 30 percent during the same period.

**Table 3.1-1: Expected Growth in Regional and County Population**

| | 2000 | 2005 | 2010 | 2025 | Total Change (2000 - 2025) | Percent Increase |
|---|---|---|---|---|---|---|
| **Region** | | | | | | |
| Population | 4,449,133 | 4,793,250 | 5,108,117 | 5,894,025 | 1,444,892 | 32% |
| Persons/Acre | 1.60 | 1.72 | 1.84 | 2.12 | 0.52 | 32% |
| **Fairfax County** | | | | | | |
| Population | 999,161 | 1,079,432 | 1,147,726 | 1,238,798 | 239,637 | 24% |
| Persons/Acre | 3.84 | 4.15 | 4.41 | 4.76 | 0.92 | 24% |
| **Loudoun County** | | | | | | |
| Population | 172,175 | 238,157 | 304,222 | 508,167 | 335,992 | 195% |
| Persons/Acre | 0.52 | 0.71 | 0.91 | 1.52 | 1.0 | 192% |

Source: MWCOG Round 6.2 Forecasts: MWCOG projections for Fairfax County include the cities of Fairfax and Falls Church.

The greatest population growth in the region will be in Loudoun, Fairfax, and Montgomery counties. The outer jurisdictions, however, will experience the fastest rates of growth and greatest total amounts of growth,


LEGEND

Regional Jurisdictions

Water Bodies

State Boundaries

Note: Metropolitan Washington Region as defined by MWCOG

0 5 10 15 MILES

Figure 3.1-1

# Washington Metropolitan Region and Northern Virginia

Dulles Corridor Rapid Transit Project

led by Loudoun (195 percent), Charles (59 percent), and Frederick (56 percent) counties. The region's central jurisdictions will grow more slowly. In Arlington County and the City of Alexandria, population will increase by 14 and 15 percent, respectively. Washington, D.C. will experience an end to its short-term population loss and is expected grow by 25 percent during the 2000 to 2025 forecast period.

MWCOG predicts an increase of more than 592,000 households in the region during the 2000 to 2025 forecast period, reflecting the growth in jobs and numbers of new residents moving into the region. The largest number of new households will be in Loudoun and Fairfax counties (shown in Table 3.1-2), and Montgomery County, which collectively will contribute nearly 50 percent of the household growth during the forecast period. Loudoun County will grow the most rapidly of all jurisdictions, adding nearly 119,000 households to a year 2000 base of 61,000 households.

**Table 3.1-2: Expected Growth in Regional and County Households**

| | 2000 | 2005 | 2010 | 2025 | Total Change (2000 - 2025) | Percent Increase |
|---|---|---|---|---|---|---|
| Region | 1,682,292 | 1,817,215 | 1,951,818 | 2,274,979 | 592,687 | 35% |
| Fairfax County | 366,248 | 399,070 | 425,949 | 458,660 | 92,412 | 25% |
| Loudoun County | 60,559 | 84,312 | 108,060 | 179,306 | 118,747 | 196% |

Source: MWCOG Round 6.2 Forecasts: MWCOG projections for Fairfax County include the cities of Fairfax and Falls Church.

Regional employment projections, shown in Table 3.1-3, predict an increase of 39 percent from 2000 to 2025, with employment experiencing a slightly higher rate of growth than both population and households.

**Table 3.1-3: Expected Growth in Regional and County Employment**

| Area | 2000 | 2005 | 2010 | 2025 | Total Change (2000 - 2025) | Percent Increase |
|---|---|---|---|---|---|---|
| **Region** | | | | | | |
| Employment | 2,796,870 | 3,072,398 | 3,319,025 | 3,891,914 | 1,095,044 | 39% |
| Jobs/Acre | 1.01 | 1.10 | 1.19 | 1.40 | 0.39 | 39% |
| **Fairfax County** | | | | | | |
| Employment | 565,112 | 628,766 | 684,590 | 768,271 | 203,159 | 36% |
| Jobs/Acre | 2.17 | 2.42 | 2.63 | 2.95 | 0.78 | 36% |
| **Loudoun County** | | | | | | |
| Employment | 85,296 | 117,872 | 145,523 | 232,762 | 147,466 | 173% |
| Jobs/Acre | 0.26 | 0.35 | 0.44 | 0.70 | 0.44 | 169% |

Source: MWCOG Round 6.2 Forecasts: MWCOG projections for Fairfax County include the cities of Fairfax and Falls Church

Employment growth will be the greatest during the 2000 to 2005 time period, when an average of 55,000 new jobs are anticipated, nearly twice the amount of jobs added during the first half of the 1990s. Nearly two-thirds of all new jobs are anticipated to be in service industries such as engineering, computer and data processing, business services, and medical research. Job growth in Northern Virginia, at 51 percent, will outpace growth in the Maryland suburbs (37 percent), and Washington, D.C. (23 percent).

Fairfax County, Prince George's County, Loudoun County, and Washington, D.C. are projected to add the largest numbers of new jobs to the region's employment base during the 2000 to 2025 forecast period, followed by Montgomery, Arlington, Frederick, and Prince William counties. Collectively, the region's inner suburbs will add the largest number of new jobs (506,000) by 2025. However, as with population and household

growth, the largest percentage increases in employment will occur in the outer suburbs of Virginia and Maryland. Although together they will add only 312,000 jobs to the region's base, they will increase their current employment by 80 percent, collectively.

Despite the tremendous growth in suburban employment shown in the forecasts, Washington, D.C. will continue to have the largest number of jobs of any single jurisdiction and will account for more than one-fifth of the region's employment. Furthermore, the central jurisdictions (Alexandria, Arlington, Prince George's County, Montgomery County, and Washington, D.C.), collectively, will account for almost one-third of regional employment.

The strong employment growth that has characterized the region has resulted in very low unemployment rates. Employment growth is projected to outpace population growth in the region. According to the Bureau of Labor Statistics, the unemployment rate for the Washington, D.C.-MD-VA-WV Primary Metropolitan Statistical Area has declined each of the last five years and was 2.3 percent in 2000. Northern Virginia has experienced an even greater labor shortage and, according to the Virginia Employment Commission, had an unemployment rate of 1.3 percent for April 2001.

#### 3.1.2.2 County Characteristics

Land use along the Dulles Corridor is controlled by Fairfax County, the Town of Herndon, and Loudoun County.

#### Fairfax County

Fairfax County encompasses 399 square miles. Over the past 50 years, Fairfax County has changed from a rural and agricultural area to an urbanized metropolitan area. The county, particularly the eastern portion, is now largely developed, and includes a mixture of low-density residential, commercial, industrial, and public land uses. About 54 percent of the land in Fairfax County is used for residences. Industrial and commercial land uses each account for almost 4 percent of the total developed acreage. Other major land uses include parklands (12 percent) and public facilities or institutions (11 percent). About 16 percent of the land in Fairfax County is now vacant or undevelopable open space.

With 93.5 million square feet of office space, and more than a half million employees, Fairfax County is the tenth largest suburban office market in the nation (Fairfax County Economic Development Authority, June 2001). The majority of this development has taken place along the major transportation corridors in the county: the Dulles Toll Road, I-66, I-495 (Capital Beltway), I-395/I-95, and Route 28.

The highest growth rates in Fairfax County occurred during the decades of the 1940s and 1950s when the county had 140- and 180-percent growth rates, respectively (U.S. Census). While the rate of growth has slowed since that time, the county is continuing to grow and is approaching a million residents, making it the most populous jurisdiction in the region.

MWCOG projections show the county population increasing by approximately 15 percent over the next ten years, and 24 percent over the next 25 years. In 2025, Fairfax County will still be most populous jurisdiction in the region and will be one of only two in the region with more than a million residents (MWCOG Round 6.2).

Fairfax County has more than 350,000 housing units, of which 50 percent are single-family homes, 30 percent are multi-family units, and 20 percent are townhouses. Over the past four years, Fairfax County has issued

more than 18,000 permits for new homes, which represents about five percent of the county's entire housing stock (Washington Area Housing Partnership, March 2001).

Employment in Fairfax County has increased and will continue to increase rapidly. This reflects the intense job growth occurring in the suburban activity centers within the county. This growth has led to an unemployment rate of 1.6 percent in the county (Virginia Employment Commission, April 2001). As shown in Table 3.1-3, employment in Fairfax County is estimated to increase by 36 percent over the next 25 years, adding more than 200,000 jobs and growing faster than population in the county.

### Loudoun County

Loudoun County encompasses 517 square miles and is much more rural than Fairfax County. More than 61 percent of the total land area in the county is used for agricultural purposes, and 24 percent is in residential use. Industrial and commercial uses account for six percent of the total acreage, with public and open space uses accounting for the remaining nine percent (Loudoun County Department of Economic Development, May 2000).

Like Fairfax County, commercial development is focused along the county's major transportation corridors: Route 7, Route 28, and the Dulles Greenway. The county contains 7.3 million square feet of office space, and 9.4 million square feet of industrial and flex space for more than 85,000 employees (Loudoun County Department of Economic Development, May 2000). Almost all the commercial development in the county is focused in the eastern portion of the county, leaving the remainder of the county largely agricultural, with a handful of small towns located at major crossroads.

The rapid growth in Loudoun County is part of a second wave of suburban expansion. From 1900 to 1960, the population of the county remained relatively stable, increasing from 21,948 to 24,549. However, starting in the 1960s, the county began three decades of approximately 50 percent growth per decade. According to the most recent U.S. Census, the county increased in population by more than 95 percent in the past decade, resulting in a 2000 population of 169,599.

Loudoun County's population is expected to increase 75 percent over the next 10 years, and by nearly 200 percent over the next 25 years. With more than half a million residents, Loudoun County's population will begin to approach that of the District of Columbia (MWCOG Round 6.2). Although the average population density in Loudoun County will continue to be low due to the size of the county (517 square miles), the vast majority of new development is planned for the eastern third of the county, resulting in significantly higher densities in that area.

Although Fairfax County has far more units than Loudoun County, Loudoun County's housing stock is growing at a faster rate. Loudoun County has approximately 64,000 units, with 57 percent single-family, 27 percent townhouses, and 16 percent multi-family. Over the next 20 years, Loudoun County will see an increase in the number of townhouses built, increasing the townhouse share of the housing stock to more than 30 percent (Loudoun County Department of Economic Development, June 5, 2000). Since 1997, Loudoun County has issued more than 17,000 permits for new homes, which represents about a quarter of its entire housing stock (Washington Area Housing Partnership, March 2001).

Employment in Loudoun County is expected to increase almost five times as fast as Fairfax County over the next 25 years. This reflects the job growth occurring in the existing and emerging activity centers in the county. Due to this rapid growth, Loudoun County's unemployment rate was 1.2 percent in 1999 (Virginia

Employment Commission, April 2001). As shown in Table 3.1-3, employment in Loudoun County is estimated to increase by over 170 percent by 2025, adding about an additional 150,000 jobs.

### 3.1.2.3 Land Use Controls and Comprehensive Planning

Fairfax County, the Town of Herndon, the City of Falls Church, the Town of Vienna, and Loudoun County regulate land use within the study area through comprehensive planning and zoning ordinances. All current comprehensive plans and zoning ordinances for the study area were reviewed to determine their land use objectives and transportation policies in relation to the project. A brief summary of the comprehensive plans that guide land use within the corridor follows. The proposed land use as defined in these comprehensive plans is shown in Figure 3.1-2, and reflects the mix of uses are currently permitted in the corridor.

#### Comprehensive Plan for Fairfax County

The *Fairfax County Comprehensive Plan* has three components: the Policy Plan, Area Plan volumes, and the Comprehensive Plan Map. The Policy Plan explains the county's goals, objectives, and policies regarding land use, transportation, housing, the environment, and other planning areas. The Area Plans are site-specific, and are divided into Planning Districts, Community Planning Sectors, and special areas, such as the Tysons Corner Urban Center and several Suburban Centers. The third component, the Comprehensive Plan Map, is a generalized depiction of the pattern of future land use, transportation, public facilities, and other planned features.

The Area Plans implement the Policy Plan's goals and objectives at the more detailed Planning District and Community Planning Sector levels. The Area Plans contain detailed recommendations for a wide range of planning areas. The Dulles Corridor includes the McLean, Vienna, and Upper Potomac planning districts, the Tysons Corner Urban Center, the Reston-Herndon Suburban Center, and the Dulles Suburban Center. Based on the work of the Dulles Corridor Land Use Task Force, appointed by the Fairfax County Board of Supervisors to review the *Fairfax County Comprehensive Plan* as part of the County's commitment to transit supportive policies in the corridor, revisions to the Comprehensive Plans for Reston, the Herndon area outside of the Town of Herndon, and the Dulles Corner area were recently adopted by Fairfax County, and have been incorporated into this analysis.

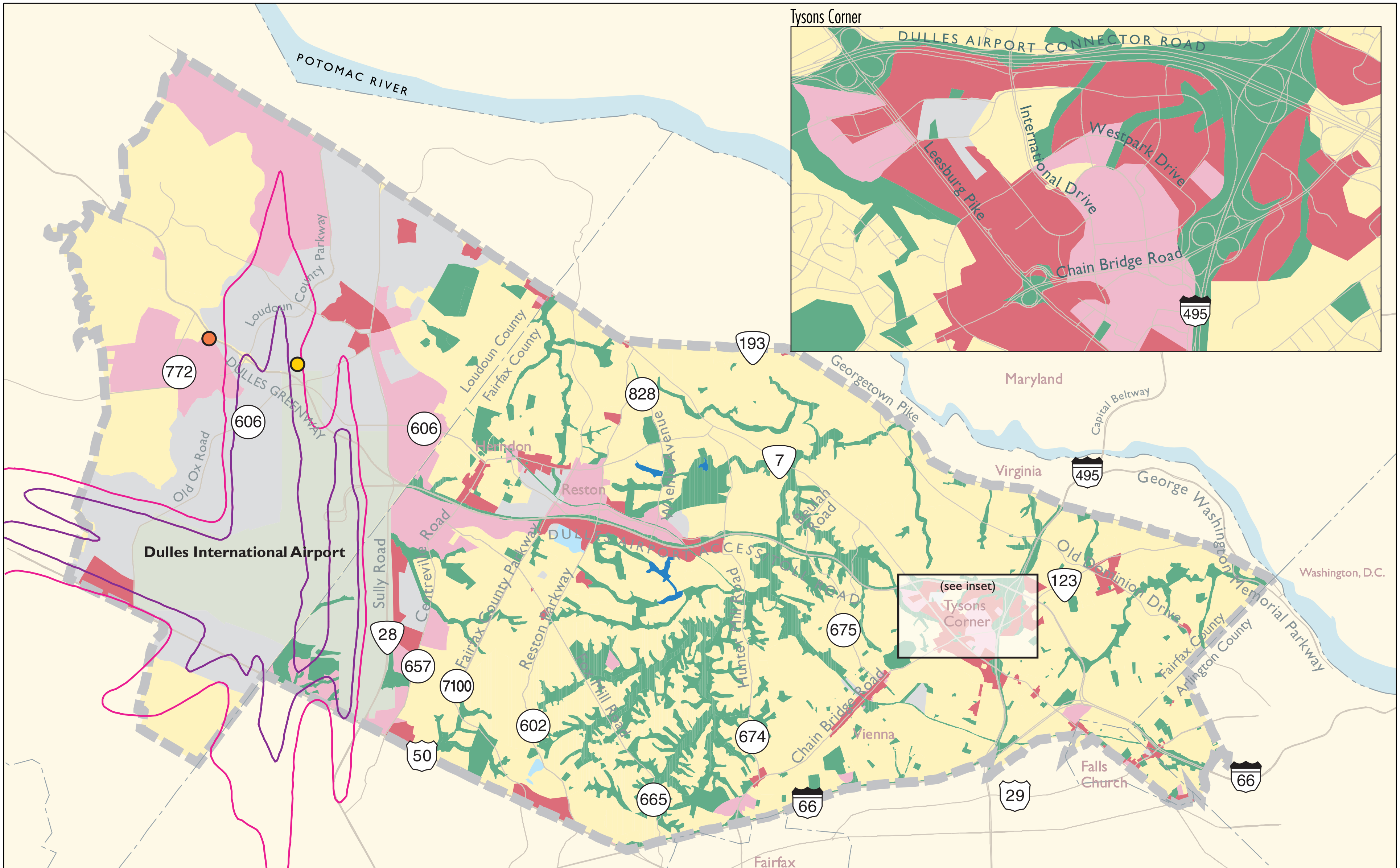
In addition, the Land Use Task Force recommended that covenants that are in effect in Reston be lifted. These covenants restrict residential development from within close proximity to the Dulles Corridor and would have to be lifted in order for Fairfax County to implement mixed use at the Transit Station Areas in Reston.

#### Town of Herndon Comprehensive Plan

The *Town of Herndon's Comprehensive Plan*, adopted June 1990, sets goals for land use, parks and recreation, public facilities, transportation, and heritage preservation. All land within the town is assigned to one of four land use categories: neighborhood conservation, services and industry, community and facilities, and adaptive areas. Each of these categories has general land use goals established for large areas of the town, with specific uses and densities specified in the zoning regulations.

#### Loudoun County General Plan (1991)

Loudoun County's General Plan was developed during 1990 and 1991. The policies in the *General Plan* focus on distributing growth fairly so that new development functions in harmony with existing communities. The plan established Urban Growth Areas to accommodate the anticipated growth around the towns and provide substantial room for new development. The plan views western Loudoun County as an agricultural and open




LEGEND

Industrial
Institutional
Hydrology
Open Space
Residential
Office
Mixed Use
County Boundary
Dulles Corridor Boundary
Transit Related Employment Center (TREC)
Transit Oriented Development (TOD)
Ldn60
Ldn65

1 2 3 MILES

Figure 3.1-2

# Proposed Land Use in the Corridor

Dulles Corridor
Rapid Transit Project

space resource with low overall development densities, preferably in the traditional clustered pattern of towns, villages, and hamlets. The plan has been recently revised (as described below) and these changes are incorporated into this analysis.

#### Loudoun County Toll Road Plan (1995)

During the development of the General Plan, the Loudoun County Planning Commission and Board of Supervisors identified the need to formulate more specific land use policies for land that straddles the Dulles Greenway. In 1995, the county issued the *Toll Road Plan*, with the goal of maximizing the economic benefit from development of the corridor. The *Toll Road Plan*, although separate from the General Plan, is part of the County's comprehensive plan. In Loudoun County, the Dulles Corridor falls within the Toll Road Plan's area.

The land use strategy for the Dulles Toll Road area is designed to promote compact development at interchange and transit facilities. The highest intensity development in the planning area would occur at nodes, which are planned around the Route 606 and Route 772 interchanges with the Dulles Greenway. Nodes are intended to be areas of dense, compact development centered on a transit station with densities tapering from the core. The *Toll Road Plan* states that nodes will be mixed-use in character in all locations, except for those located within Business Employment areas, which will not have a residential component.

#### Loudoun County Revised General Plan (2001)

In January 2000, the Board of Supervisors initiated a complete review of the 1991 *General Plan* and *Countywide Transportation Plan*, and other supporting documents and ordinances, which together comprise the Loudoun County Comprehensive Plan. The purpose was to identify and deal with issues posed by the unprecedented growth and change in the county over the previous decade.

The *Loudoun County Revised General Plan* refines recommended uses within the corridor, including more detail on transit nodes, the Transit-Related Employment Center (TREC) located in the vicinity of Route 606, and the Transit-Oriented Development node located between Loudoun County Parkway and Route 772. The *Loudoun County Revised General Plan* was adopted by the Loudoun County Board of Supervisors (BOS) in July 2001.

### 3.1.2.4 Corridor Characteristics

The Dulles Corridor is expected to experience substantial growth (more than 50 percent) in population and in employment (over 70 percent) over the next 25 years. However, land use patterns throughout the corridor are expected to remain largely as they are today, with most new growth occurring at existing and emerging activity centers including Tysons Corner, Reston/Herndon, Dulles Corner, and Corporate Dulles (generally the area north of the Dulles Greenway around Routes 606 and 772).

The following sections discuss existing land use within the study areas, as well as changes in population, housing, and employment for each of the project corridor sections.

#### Orange Line Connection

This project section includes areas that are adjacent to the Dulles Connector Road. Land use in the area surrounding the Dulles Connector Road is almost entirely residential in nature. A high school, a continuing education center, and two apartment complexes are located south of the West Falls Church Station. Northwest of the station, land on both sides of the Dulles Connector Road is dominated by neighborhoods of single-family homes, the largest being Pimmit Hills to the west. Incorporated into these neighborhoods and adjacent to the Dulles Connector Road are two county-owned parks.

According to the *Fairfax County Comprehensive Plan,* development in the area surrounding the Dulles Connector Road will continue to be residential in the future. Infill and redevelopment is expected to generate small increases in population and employment in this section, as shown in Table 3.1-4.

**Table 3.1-4: Growth in Orange Line Connection Population and Employment**

| | 2000 | 2005 | 2010 | 2025 | Total Change (2000 – 2025) | Percent Increase |
|---|---|---|---|---|---|---|
| Population | 15,790 | 16,143 | 16,549 | 17,567 | 1,777 | 11% |
| Persons/Acre | 7.03 | 7.19 | 7.37 | 7.82 | 0.79 | 11% |
| Households | 5,884 | 6,032 | 6,205 | 6,660 | 776 | 13% |
| Employment | 5,064 | 5,190 | 5,326 | 5,447 | 383 | 7% |
| Jobs/Acre | 2.25 | 2.31 | 2.37 | 2.43 | 0.18 | 8% |

Source: MWCOG Round 6.2 Forecasts

### Tysons Corner

East of the Capital Beltway, the Tysons Corner area consists primarily of offices with areas of residential development located on the fringe. Two parks and a school are located in this area as well. Commercial land use is located along Old Meadow Road and Colshire Drive. Residential land consists of three multi-family developments and retail land uses, including the Commons Shopping Center. The *Fairfax County Comprehensive Plan* calls for this area of Tysons Corner to maintain roughly the same proportion of land uses, but at a more intense level. Commercial uses in this area are to continue their development as office parks. The vacant parcels would infill with additional office use; low-rise buildings would redevelop to mid-rise and high-rise office buildings with supporting retail and service uses. In the residential areas, the plan calls for continued residential use at the existing scale with redevelopment of existing garden apartments to mid-rise, multi-family dwelling use to encourage more housing adjacent to employment locations.

West of the Capital Beltway, Tysons Corner is divided into several areas of development with various types of land use. The West*Park area is located north of Westpark Drive and east of International Drive and includes more than five million square feet of office space in more than 25 buildings. Non-commercial land uses in the West*Park area include the McLean Hilton hotel at the eastern end of Jones Branch Drive, and the Lincoln Apartments complex adjacent to International Drive. The West*Park area is planned to continue as an office park, with supporting retail and services, and the option of residential uses.

Immediately south of West*Park is the Tysons II area, bounded by Westpark Drive, International Drive, and Route 123. It includes the Galleria at Tysons II shopping mall and a significant amount of office, hotel, and residential land uses. The Galleria has more than a million square feet of retail space. Adjacent to the mall are several large office towers and a hotel. To the north of the shopping mall are two residential developments. The area also has a significant amount of vacant land, particularly along Route 123. The Tysons II area would maintain its regional shopping, office, and hotel base, with additional office and hotel uses on undeveloped parcels. Residential development could replace some non-residential uses

The Tysons I area is bounded by Route 123, Route 7, and the Capital Beltway. This area contains the largest shopping mall in the region (eighth largest in the country), the Tysons Corner Center, as well as several office buildings and smaller retail land uses. The Tysons Corner Center area is to continue its regional shopping role, but could add convention or recreation uses. West of International Drive, the area surrounding the Route 7 and Route 123 interchange is envisioned to gradually redevelop from the existing strip retail development to mid-rise and high-rise office buildings that would include support retail and service uses.

International Drive, Westpark Drive, Route 123, and Route 7 bound the Greensboro Drive area, which features much of the prominent office development in Tysons Corner. Three hotels are located in the area, as well as several small retail facilities at the Route 7/Route 123 interchange. The most prominent feature in the area north of Greensboro Drive is the Rotonda Condominium Complex, which has more than 1,100 units. In contrast to the large shopping malls to the east, retail land use within this portion of Tysons Corner is focused along Route 7 and consists primarily of car dealerships and an assortment of service and convenience retail outlets. Adjacent to the DAAR and Dulles Toll Road, the Tyco area includes the majority of the industrial uses in the Tysons Corner study area, including several automobile repair shops, two storage facilities, and a flex industrial building.

In the future, the Greensboro Drive area would continue to be the office core of Tysons Corner. Because there is no undeveloped land, infill and redevelopment opportunities would be encouraged. Some surface parking lots could be redeveloped into office space with structured parking. In addition, the development of pedestrian-oriented plazas and courtyards is encouraged in the Tysons Corner comprehensive plan. The high-density residential uses to the north and east of Greensboro Drive are anticipated to remain, while the industrial area to the north of Spring Hill Road could either remain industrial or be redeveloped for mixed use. The retail uses along Route 7 are planned for redevelopment with mid-rise and high-rise office buildings that include retail and support services.

West of Route 7, the study area includes a mixture of office parks, strip retail, hotels, and other uses. Major commercial development is centered on Spring Hill Road and Westwood Center Drive, generally in multi-building office parks near the DAAR and Dulles Toll Road. The Pike 7 Plaza and Tysons Square strip malls are located adjacent to a large car dealership, hotel, and large apartment community. West of the retail land use on Route 7 are a number of residential uses, including townhouse communities, which provide a buffer for the single-family neighborhoods farther west.

Tysons Corner has grown from a rural crossroads with a general store in the 1950s to the primary urban center of Fairfax County today. Tysons Corner has roughly 14,000 residents and 89,000 employees. Although Tysons Corner contains less than two percent of the county's population, it has approximately 16 percent of the county's jobs. As shown in Table 3.1-5, these figures are expected to increase at a faster rate than the rest of Fairfax County. By 2025, population in Tysons Corner will increase by 36 percent and employment will increase by 42 percent.

### Mid-Corridor

Land use in the Mid-Corridor section varies from purely residential neighborhoods in the east to suburban office parks in the west. West of Tysons Corner and east of Reston are single-family detached homes on half-acre to 1-acre lots. This area also includes the Wolf Trap Farm Park for the Performing Arts. West of Hunter

**Table 3.1-5: Growth in Tysons Corner Population and Employment**

| | 2000 | 2005 | 2010 | 2025 | Total Change (2000 – 2025) | Percent Change |
|---|---|---|---|---|---|---|
| Population | 13,900 | 16,241 | 18,336 | 18,920 | 5,020 | 36% |
| Persons/Acre | 6.17 | 7.21 | 8.13 | 8.39 | 2.22 | 36% |
| Households | 7,067 | 8,284 | 9,385 | 9,652 | 2,585 | 36% |
| Employment | 88,585 | 102,623 | 115,111 | 125,991 | 37,406 | 42% |
| Jobs/Acre | 39.30 | 45.53 | 51.07 | 55.90 | 16.80 | 42% |

Source: MWCOG Round 6.2 Forecasts

Mill Road, the section includes parts of Reston, Herndon, and Dulles Corner, an area made up of suburban office parks adjacent to the DAAR and Dulles Toll Road, with residential areas, primarily single-family neighborhoods, at the periphery.

Within the section generally bounded by the Route 7 and DAAR and Dulles Toll Road interchange and Hunter Mill Road, the dominant land use is single-family residential, with some small institutional uses such as churches. Major parklands include the Wolf Trap Farm Park for the Performing Arts and the Barns of Wolf Trap, located north and south of the DAAR and Dulles Toll Road, respectively. A golf driving range is located north of the DAAR and Dulles Toll Road at Hunter Mill Road.

Reston, a planned community located on either side of the DAAR and Dulles Toll Road, extends from the Hunter Mill Road interchange on the east to the Fairfax County Parkway on the west. Residential areas are located north of Sunset Hills Road and south of Sunrise Valley Drive, with an approximately equal number of residents on either side. Residential development was prohibited from parcels immediately adjacent to the Dulles Toll Road between Sunset Hills Road and Sunrise Valley Drive until recent changes in the *Fairfax County Comprehensive Plan*, and it is still prohibited by existing land covenants. In general, land between Sunrise Valley Drive and Sunset Hills Road has been developed with commercial office space, although retail land uses are also present. The Reston Town Center features more than 900,000 square feet of office space in three towers and one low-rise building, and more than 50 shops and restaurants. The retail space, totaling 270,000 square feet, also includes a 13-screen movie theater. An outdoor ice skating rink is open to the public during the winter and used for outdoor events during the other seasons. More retail space is located west of the Reston Town Center on Sunset Hills Road. There is a cluster of small retail outlets adjacent to the Reston International Center. The study area also includes the Hyatt Regency at the Town Center, the Sheraton Reston Hotel at the Reston International Center, and the Homestead Studio Suites Hotel.

Open space within the Reston area includes portions of the Reston National Golf Club, Hidden Creek Country Club, and a portion of the 45-mile Washington and Old Dominion (W&OD) Railroad Regional Park.

Institutional uses in Reston are an 827-space park-and-ride lot at Wiehle Avenue for express buses that run to West Falls Church Metrorail Station, additional parking within the power easement adjacent to the W&OD Railroad Regional Park, and the headquarters of the U.S. Geological Survey (USGS).

A number of undeveloped parcels in Reston are near Wiehle Avenue. Two are located on Michael Faraday Court, another is adjacent to Isaac Newton Square, and several small parcels used as a power easement are adjacent to the W&OD Railroad Regional Park. Undeveloped land also exists near the Reston Parkway. Nearly 10 percent of the area near Reston, including parcels near the Reston Town Center, is undeveloped.

The Town of Herndon, and portions of Fairfax County known as Dulles Corner, lie west of Reston. A variety of land uses are within this part of the Mid-Corridor, including office development north of Sunrise Valley Drive and along both sides of Herndon Parkway in Herndon and in the Dulles Corner area. Office use in the Mid-Corridor also includes the Dulles Technology Center and Dulles Corner Park on Fox Mill and Horse Pen Roads. The Dulles Technology Center contains low- and mid-rise office/flex development. The Dulles Corner Park is located between Horse Pen Road and the Dulles Toll Road/Route 28 interchange. Each of these office parks also includes a hotel.

Three institutional uses are located within this portion of the Mid-Corridor area: Hutchison Elementary School, the Center for Innovative Technology (CIT), and the Herndon-Monroe Park-and-Ride. Hutchison Elementary School on Parcher Avenue, adjacent to the DAAR and Dulles Toll Road, enrolls approximately 1,000 students. The CIT, located on Innovation Avenue at Rock Hill Road, is a state-chartered, non-profit corporation. The Herndon-Monroe Park-and-Ride lot, owned and operated by Fairfax County, is located south of the DAAR and Dulles Toll Road. The facility has 1,745 parking spaces and provides connections to a number of local and express buses. Residential land use in the Herndon/Dulles Corner area consists of single-family homes with some townhouses, condominium units, and apartments. West of Rock Hill Road, a number of single-family homes are located on 2- to 5-acre lots. Both active and passive recreation sites are located within the area. They include the Haley M. Smith Park and Sunrise Valley Park Wildlife Habitat and Nature Preserve.

As part of recent revisions to the *Fairfax County Comprehensive Plan*, the county has defined some portions of the Mid-Corridor section areas as Transit Station Areas. Within these Transit Station Areas, located at Wiehle Avenue, Reston Parkway, Herndon-Monroe, and Route 28, proposals for changes in land use mix are now incorporated into the latest revisions in the Comprehensive Plan. These changes occurred too recently to have been incorporated into the most recent regional projections prepared by MWCOG. The changes in land use mix are now permitted without the construction of BRT or Metrorail and could result in a change of land uses from office to mixed-use, allowing for residential development to occur in the study area by 2025. As stated previously, covenants must be lifted in order for residential development to occur in close proximity to the Dulles Corridor in Reston. Additional density bonuses are permitted if BRT or rail is implemented.

Within the section of the corridor generally bounded by the Route 7 interchange with the DAAR and Dulles Toll Road, no changes in land use are projected by 2025 for the majority of residential areas. However, consolidation of administrative offices by the Wolf Trap Foundation into the new Education Center proposed along Trap Road would allow some land to be converted to single-family homes.

Land in the rest of the Mid-Corridor section is projected to continue to develop into office, residential, and mixed-use classifications as the undeveloped parcels are developed. However, the recent changes to the *Fairfax County Comprehensive Plan* are likely to encourage the introduction of residential uses along the DAAR and Dulles Toll Road by 2025.

Intensification of residential and commercial development is expected to occur, as reflected in Table 3.1-6. Most growth in the Mid-Corridor section is anticipated to occur in the Reston, Herndon, and CIT/Dulles Station areas. Reston is projected to add more than 15,000 residents and nearly 20,000 employees, while the Herndon/Dulles area is expected to add nearly 20,000 residents and 22,000 employees.

**Table 3.1-6: Growth in Mid-Corridor Population and Employment**

| | 2000 | 2005 | 2010 | 2025 | Total Change (2000 – 2025) | Percent Change |
|---|---|---|---|---|---|---|
| Population | 120,486 | 135,183 | 146,644 | 158,376 | 37,890 | 31% |
| Persons/Acre | 5.18 | 5.82 | 6.31 | 6.81 | 1.63 | 31% |
| Households | 44,728 | 50,807 | 55,465 | 59,521 | 14,793 | 33% |
| Employment | 78,085 | 92,861 | 106,684 | 119,655 | 41,570 | 53% |
| Jobs/Acre | 3.36 | 3.99 | 4.59 | 5.15 | 1.79 | 53% |

Source: MWCOG Round 6.2 Forecasts

Despite the *Fairfax County Comprehensive Plan's* language allowing residential development in this area, the Reston Center for Industry and Government Declaration of Protective Covenants and Restrictions prohibits residential development of any kind in areas that have been zoned for industrial or commercial uses. For any residential development to be permitted in these areas, the owners of the property must amend the covenants.

### Dulles Airport

Dulles International Airport, described in Section 1.2.2.4 and shown in Figure 1.1-1, is on 11,000 acres of land within both Fairfax and Loudoun counties west of Route 28. The airport section is located entirely within the airport property and includes the terminal, parking facilities, and associated buildings. The terminal buildings have more than 50 shops and restaurants. No residential facilities are on the airport property.

The Metropolitan Washington Airports Authority (MWAA) recently completed a new master plan for improvements to Washington Dulles International Airport. This plan calls for $3.4 billion in improvements, including the construction of a new circulator people mover system, two new parking garages, an additional concourse, and an additional runway, all of which are to be completed by 2007. This expansion is needed to accommodate projected increases in passengers and employment at the airport.

Table 3.1-7 2000 to 2025 shows the estimated population and employment projections for the airport, as developed by MWCOG. MWAA has prepared its own projections for growth that are more aggressive than those shown in Table 3.1-7. As part of their planning efforts, MWAA projects that employment will grow to 30,000 by 2010 and as much as 65,000 by 2035. In comparison, the MWCOG projections in Table 3.1-7 are much lower.

**Table 3.1-7: Growth in Dulles Airport Population and Employment**

| | 2000 | 2005 | 2010 | 2025 | Total Change (2000 – 2025) | Percent Change |
|---|---|---|---|---|---|---|
| Population | 0 | 0 | 0 | 0 | n.a. | n.a. |
| Persons/Acre | 0 | 0 | 0 | 0 | n.a. | n.a. |
| Households | 0 | 0 | 0 | 0 | n.a. | n.a. |
| Employment | 12,076 | 15,266 | 17,120 | 26,512 | 14,436 | 119% |
| Jobs/Acre | 1.18 | 1.49 | 1.67 | 2.59 | 1.41 | 119% |

Source: MWCOG Round 6.2 Forecasts

### Loudoun County

The Loudoun County section is bounded by Route 7 to the north, Fairfax County to the east and Route 659 and Goose Creek to the west, exclusive of Dulles International Airport property. This portion of the corridor has industrial, residential, and undeveloped land. The eastern portion of this section, nearest Dulles International Airport, is largely industrial in nature and dominated by several large warehouse facilities. The western portion of the study area, where developed, is residential, ranging from multifamily complexes to large-lot, single-family homes.

Most of the future projections for Loudoun County are based on the conversion of currently undeveloped land into industrial, office, and residential development, as guided by the *Revised General Plan*.

The *Loudoun County Revised General Plan* calls for the development of "keynote employment" and industrial land uses in the eastern portion of the Dulles Greenway north of the airport. In general, the area south of the Dulles Greenway and outside the airport property is planned for industrial use. North of Dulles Greenway, plans call for large-scale regional office development and the creation of a high-density node immediately north

of the airport property. Due to its proximity to the airport, county regulations prohibit residential development in this node.

Along the Dulles Greenway near Route 772, the planned land use is a high-density, mixed-use node for office, residential, and retail development. The area north of the Dulles Greenway is planned for a regional office node that could include 15 to 25 percent residential land uses. South of the Dulles Greenway, the *Revised General Plan* calls for development of a mixed-use node. Land north of the station is designated for high-density residential development.

This area is expected to receive much of Loudoun County's growth over the next 25 years (see Table 3.1-8). With population and employment expected to increase by 177 percent and 216 percent respectively, this area would continue its transformation from rural to suburban development patterns.

**Table 3.1-8: Growth in Loudoun County Population and Employment**

| | 2000 | 2005 | 2010 | 2025 | Total Change (2000 – 2025) | Percent Change |
|---|---|---|---|---|---|---|
| Population | 52,234 | 75,501 | 98,948 | 144,634 | 92,400 | 176% |
| Persons/Acre | 1.68 | 2.42 | 3.18 | 4.64 | 2.96 | 176% |
| Households | 18,675 | 27,233 | 35,881 | 52,514 | 33,839 | 181% |
| Employment | 39,895 | 59,257 | 76,299 | 126,252 | 86,357 | 216% |
| Jobs/Acre | 1.28 | 1.90 | 2.45 | 4.05 | 2.77 | 216% |

Source: MWCOG Round 6.2 Forecasts

### 3.1.3 LONG-TERM EFFECTS

This section discusses the long-term (2025) effects to land use that would result from the Baseline, BRT, Metrorail, and BRT/Metrorail and Phased Implementation alternatives. These effects are defined as direct changes in land use that would occur as a result of implementing the alternatives under consideration and the compatibility of the proposed alternatives and alignments with locally adopted Comprehensive Plans. Secondary development effects, such as increased densities and changes in land use mix, that would be projected to occur in conjunction with project alternatives and these effects are discussed in Chapters 5 and 9. A summary of land use compatibility is presented in Table 3.1-9 and discussed in the sections that follow.

**Table 3.1-9: Land Use Compatibility**

| Alternative | Compatible with Existing Land Use? | Compatible with Future Land Use? | Consistent with Comprehensive Plans? |
|---|---|---|---|
| Baseline | Yes | Yes | No, plans all include Dulles Corridor Rapid Transit project as element of transportation system |
| BRT | Yes | Yes | Somewhat. Preference for rail stated in Tysons Plan. BRT 2 and BRT 3 are inconsistent due to lack of four median stations in Mid-Corridor. |
| Metrorail | Yes | Yes | Yes |
| BRT/Metrorail | Yes | Yes | Yes, for combinations including BRT 1 |
| Phased Implementation | Yes | Yes | Yes |

#### 3.1.3.1 Baseline Alternative

Under the Baseline Alternative, land use would continue to be directed by existing comprehensive planning guidelines with no transit-based density bonuses, and no land use would be converted due to the construction of the Dulles Corridor Rapid Transit Project. Because locally adopted comprehensive and transportation plans, as well as local zoning ordinances, are in place to regulate land use development and to implement the transportation projects included in the Baseline Alternative, the Baseline Alternative is compatible with existing and future land use in the corridor. However, the Baseline Alternative is not compatible with locally adopted comprehensive plans. The comprehensive plans for all localities include the provision of transit within the Dulles Corridor as a critical element of their transportation systems by 2025. Projected population, housing, and employment information for the Baseline Alternative would be the same as the projected growth for 2025 (see Section 3.1.2).

#### 3.1.3.2 BRT Alternative

The BRT Alternative is consistent with the *Fairfax County Comprehensive Plan* and the *Loudoun County Revised General Plan*, which reference the potential for BRT or Metrorail service in the corridor. The BRT Alternatives are consistent with existing and future land uses in the corridor. A mix of existing land uses along the corridor and several major activity centers could support transit, particularly in Fairfax County.

The BRT Alternative is generally consistent with the comprehensive plans for the localities, which all include references to the potential for BRT within the median of the DAAR. However, the recent revisions to the *Fairfax County Comprehensive Plan for Area III*, which includes the Mid-Corridor areas of Reston, Herndon, and the Dulles Suburban Center, specify land use goals associated with the provision of all four median stations at Wiehle Avenue, Reston Parkway, Herndon-Monroe, and Route 28. Because BRT 2 does not include a station or stop at Route 28, it is inconsistent with the goals of the recent revisions. Moreover, since BRT 3 does not include median stations at Route 28, Herndon-Monroe, or Wiehle Avenue, it is also inconsistent.

##### Alignment BRT 1

The BRT 1 Alignment is consistent with existing and future land uses within the corridor. Because the alignment would be located within an existing transportation land use area (the median of the DAAR, the Toll Road and Dulles Greenway), there would be little direct conversion of land uses other than at station locations where touchdowns and station facilities would be located. The presence of Alignment BRT 1 within an existing and future transportation corridor ensures that it would not conflict with any of the surrounding land uses that are already in close proximity to this transportation facility. The presence of additional transit facilities would not change the underlying transportation land use that already is present and would continue in the future.

**Orange Line Connection.** In the Orange Line Connection section, Alignment BRT 1 would lie entirely within the Dulles Connector Road; therefore no land use conversion is expected. The *Fairfax County Comprehensive Plan* calls for no land use changes in this area based on the implementation of BRT. Land in the median of the Dulles Connector Road at the West Falls Church Station would be used for the construction of the layover and welfare facility associated with the BRT Alternative. No changes to population, housing, or employment are expected to result from the implementation of Alignment BRT 1.

**Tysons Corner.** In Tysons Corner, Alignment BRT 1 would be located within the median of the DAAR; no conversion of land uses is expected. The BRT Pedestrian access to the Spring Hill Road Station would be provided only on the south and would connect to the existing Tysons-West*Park Transit Station, resulting in

no land use conversion. The *Tysons Corner Urban Center Plan*, a component of the *Fairfax County Comprehensive Plan*, references the potential for rapid transit service within the corridor at the proposed Alignment BRT 1 location. Thus, Alignment BRT 1 would be consistent with adopted comprehensive plans. However, construction of only Alignment BRT 1, without any Metrorail service through Tysons Corner, would not achieve several of the goals for Tysons Corner, including the creation of transit-oriented development that is allowed only with the construction of rapid rail through the core of Tysons Corner.

No changes to population, housing, or employment are expected to result from the implementation of Alignment BRT 1.

**Mid-Corridor.** Within the Mid-Corridor section of the project, recent *Fairfax County Comprehensive Plan* amendments refer to the BRT Alternative and the construction of BRT median stations.

Within the Mid-Corridor section, Alignment BRT 1 would be located entirely within the existing right-of-way for the DAAR. No land use conversions would be projected, except for land converted as part of the construction of BRT stations at Wiehle Avenue, Reston Parkway, Herndon-Monroe Park-and-Ride, and Route 28.

Under the *Fairfax County Comprehensive Plan*, the area that would be used for the Wiehle Avenue Station facilities is planned for other uses, with park-and-ride facilities incorporated. North of the DAAR/Dulles Toll Road, the station touchdown would require the conversion of approximately 40 spaces at the existing county-owned park-and-ride lot. Recently adopted comprehensive plan amendments permit this park-and-ride lot, which is planned for mixed-use development, to have a Floor Area Ratio (FAR) of up to 1.5 with implementation of BRT. The area planned for the pedestrian bridge touchdown and sidewalk facilities on the south side is currently a landscaped buffer that is part of an office development on Sunrise Valley Drive.

The proposed Reston Parkway Station facilities for Alignment BRT 1 would be located partially on land that has been proffered for transit facilities. The facilities on the north side of the DAAR and Toll Road would displace approximately 90 to 100 parking spaces in the existing TRW parking lot, which were not proffered for transit facilities, and would include about one-half acre of undeveloped land, which was proffered. On the south side, approximately 70 parking spaces at the Nextel building on Edmund Halley Drive and about 1.25 acres currently used for drainage would be used. The facility would include bus bays, Kiss & Ride, and station entrance pavilion on both the north and south side of the DAAR and Dulles Toll Road.

Facilities at the Herndon-Monroe Station would require land north of the DAAR and Dulles Toll Road. Approximately 10 parking spaces in the President's Plaza office development would be used for the station entrance pavilion. South of the DAAR and Dulles Toll Road, touchdown facilities would be incorporated into the existing Herndon-Monroe Park-and-Ride lot.

Most of the area that would be used for the Route 28 Station facilities has been proffered for transit facility uses. The land required for the station touchdown, bus bays, and Kiss & Ride facilities on the north side of the proposed BRT Alternative station is currently undeveloped. South of the DAAR and Dulles Toll Road, undeveloped land, planned for mixed-use development, would be converted to bus bays, Kiss & Ride, and park-and-ride facilities under the BRT Alternative. These proposed station facilities have been incorporated into the approved development plan for the area.

The location of the stations at Wiehle Avenue and Reston Parkway to the west of the bridges for these facilities would not preclude access to all four quadrants as the area develops. The current station sites would achieve the goals of transit-oriented development by not locating intense development in the same spot as public rights-of-way required for roads and station facilities.

In the Mid-Corridor section, the changes in allowable density and mix of uses associated with implementation of BRT 1 would modify population, housing, and employment estimates for the station areas (Wiehle Avenue, Reston Parkway, Herndon-Monroe, and Route 28). The projected results of these increases are a 15 percent increase in population, a 19 percent increase in households, and a 21 percent increase in employment at the station areas (see Table 3.1-10). These projections are based on the secondary development projections for the BRT Alternative discussed in Chapter 9 and are prepared for planning purposes assuming that land in the Transit Station Areas either develops or re-develops to the densities allowed under the *Fairfax County Comprehensive Plan*.

**Table 3.1-10: Mid-Corridor Population and Employment with Alignment BRT 1**

| | 2025 Baseline | 2025 With BRT | Total Change | Percent Change |
|---|---:|---:|---:|---:|
| Population | 158,376 | 181,763 | 23,387 | 14.77% |
| Persons/Acre | 6.81 | 7.82 | 1.01 | 14.77% |
| Households | 59,521 | 70,942 | 11,421 | 19.19% |
| Employment | 119,655 | 144,602 | 24,947 | 20.85% |
| Jobs/Acre | 5.15 | 6.22 | 1.07 | 20.85% |

Source: MWCOG Round 6.2 Forecasts (Baseline Alternative data only), 2025 With BRT by Capital Transit Consultants.

**Dulles Airport**. Under Alignment BRT 1, the BRT Maintenance and Storage Facility would be located on MWAA property; however, no changes to land use or development intensity are anticipated from its construction or operation. Therefore, based on the implementation of Alignment BRT 1, no changes to population, housing, and employment in the Dulles Airport section of the corridor are expected to result.

**Loudoun County.** The *Loudoun County Revised General Plan* allows for increased development intensity based on the implementation of the BRT Alternative, as shown in Table 3.1-11. The BRT Alternative is referenced in the *Revised General Plan* as one alternative for providing transit service to the area. Thus, it would be consistent with adopted plans. Alignment BRT 1 is projected to have a small impact on population, housing, and employment.

**Table 3.1-11: Loudoun County Section Population and Employment with BRT Alternative (Alignments BRT 1, BRT 2, and BRT 3)**

| | 2025 Baseline | 2025 With BRT | Total Change | Percent Change |
|---|---:|---:|---:|---:|
| Population | 144,634 | 145,742 | 1,108 | 0.77% |
| Persons/Acre | 4.64 | 4.68 | 0.0 | 0.77% |
| Households | 52,514 | 52,957 | 443 | 0.84% |
| Employment | 126,252 | 128,061 | 1,809 | 1.43% |
| Jobs/Acre | 4.05 | 4.11 | 0.06 | 1.43% |

Source: MWCOG Round 6.2 Forecasts (Baseline Alternative data only), 2025 With BRT by Capital Transit Consultants

**BRT Maintenance and Storage Facility.** The BRT Maintenance and Storage Facility (Site 14) for Alignment BRT 1 (Site 14) would be approximately 26 acres in total size and could require the acquisition of one or two businesses located on Route 606 to accommodate access to the site.

### Alignment BRT 2

The land use effects of Alignment BRT 2 are the same as those of Alignment BRT 1, except that there would be less land converted for station facilities, because there would not be a median station located at Spring Hill Road or Route 28. Because the alignment is located within an existing transportation land use (the median of the DAAR and Dulles Greenway) there would be little direct conversion of land uses other than at station locations where touchdowns and station facilities would be located. The presence of Alignment BRT 2 within an existing and future transportation corridor ensures that it would not conflict with any of the surrounding land uses that are already in close proximity to this transportation facility.

The BRT Alternative is referenced in the *Fairfax County Comprehensive Plan* and the *Loudoun County Revised General Plan* as one alternative for providing transit service to the area. Thus, it would be generally consistent with adopted plans. However, the adopted *Fairfax County Comprehensive Plan* does mention a median station to be located at Route 28, and would necessitate changes in land use designed to support transit service at this location. In addition, as discussed for the BRT 1 Alignment, proffers have been negotiated with private developers to provide transit facilities at the Route 28 Station. The absence of the Route 28 median station under BRT 2 would be inconsistent with these elements of adopted plans.

**Orange Line Connection.** In the Orange Line Connection section, the *Fairfax County Comprehensive Plan* does not call for changes in land use or development intensity based on the implementation of the BRT Alternative. No changes to population, housing, or employment are expected to result from the implementation of Alignment BRT 2.

**Tysons Corner.** Within Tysons Corner, the *Fairfax County Comprehensive Plan* does not call for any changes in land use or development intensity based on the implementation of the BRT Alternative. No changes to population, housing, or employment in this section are expected to result from the implementation of Alignment BRT 2.

**Mid-Corridor.** Within the Mid-Corridor the changes in allowable density and mix of uses associated with implementation of Alignment BRT 2 would modify population, housing, and employment estimates for the proposed station areas at Wiehle Avenue, Reston Parkway, and Herndon-Monroe. These increases result in a nine percent increase in population, a thirteen percent increase in households, and a five percent increase in employment (see Table 3.1-12).

**Table 3.1-12: Mid-Corridor Population and Employment with Alignment BRT 2**

| | 2025 Baseline | 2025 With BRT | Total Change | Percent Change |
|---|---:|---:|---:|---:|
| Population | 158,376 | 173,251 | 14,875 | 9.39% |
| Persons/Acre | 6.81 | 7.45 | 0.64 | 9.39% |
| Households | 59,521 | 67,024 | 7,503 | 12.61% |
| Employment | 119,655 | 125,819 | 6,164 | 5.15% |
| Jobs/Acre | 5.15 | 5.41 | 0.26 | 5.15% |

Source: MWCOG Round 6.2 Forecasts (Baseline Alternative data only), 2025 With BRT by Capital Transit Consultants.

**Dulles Airport.** No changes in land use or development intensity are anticipated at Dulles Airport based on the implementation of Alignment BRT 2. No changes to population, housing, and employment are expected to result.

**Loudoun County.** The *Loudoun County Revised General Plan* allows for increased development intensity based on the implementation of Alignment BRT 2, which, as shown in Table 3.1-11, is projected to have a small impact on population, housing, and employment in the Loudoun County section of the corridor.

**BRT Maintenance and Storage Facility.** The land use impacts of the BRT Maintenance and Storage Facility for BRT 2 would be the same as those for BRT 1.

### Alignment BRT 3

The land use effects of Alignment BRT 3 are the same as those of Alignment BRT 1, except that there would be less land converted for station facilities, because there would not be median stations located at Spring Hill Road, Wiehle Avenue, Herndon-Monroe, or Route 28. There would be transit stops located within existing park-and-ride facilities; land use would remain a transportation use in existing and future conditions. Because the alignment is located within an existing transportation land use area (the median of the DAAR and Dulles Greenway), there would be little direct conversion of land uses other than at station locations where touchdowns and station facilities would be located. The presence of Alignment BRT 3 within an existing and future transportation corridor ensures that it would not conflict with any of the surrounding land uses that are already in close proximity to this transportation facility. The presence of additional transit facilities would not change the underlying transportation land use that already is present and would continue in the future.

The BRT Alternative is referenced in the *Fairfax County Comprehensive Plan* and the *Loudoun County Revised General Plan* as one alternative for providing transit service to the area. Thus, it would be generally consistent with adopted plans. However, the adopted *Fairfax County Comprehensive Plan* mentions a median station to be located at Wiehle Avenue, Herndon-Monroe and Route 28, and estimates changes in land use designed to support transit service at each of these locations. Although the provision of transit stops would enhance transit service at Wiehle Avenue and Herndon-Monroe, it does not allow Fairfax County to implement the transit-oriented land use changes recently adopted in its comprehensive plan because these changes are applicable only when a median station is included. As discussed for Alignment BRT 1, proffers have been negotiated with private developers to provide transit facilities at the Route 28 Station. The Town of Herndon also has adopted plans, through the Herndon-Monroe Northside Access Study, calling for a median station at Herndon-Monroe. The absence of the Wiehle Avenue, Herndon-Monroe, and Route 28 median stations would be inconsistent with these elements of adopted plans.

**Orange Line Connection.** Changes in land use along the Orange Line Connection section or development intensity based on the implementation of Alignment BRT 3 would be the same as for Alignments BRT 1 and BRT 2. No changes to population, housing, or employment are expected to result.

**Tysons Corner.** Changes in land use or development intensity at Tysons Corner based on the implementation of Alignment BRT 3 would be the same as for Alignments BRT 1 and BRT 2. No changes to population, housing, or employment are expected to result.

**Mid-Corridor.** In the Mid-Corridor, the changes in allowable density and mix of uses associated with implementation of Alignment BRT 3 would modify population, housing, and employment estimates for the Reston Parkway Station area. These increases would result in a four percent increase in population, a five percent increase in households, and a one percent increase in employment (see Table 3.1-13).

**Table 3.1-13: Mid-Corridor Population and Employment with Alignment BRT 3**

| | 2025 Baseline | 2025 With BRT | Total Change | Percent Change |
|---|---|---|---|---|
| Population | 158,376 | 164,667 | 6,291 | 3.97% |
| Persons/Acre | 6.81 | 7.08 | 0.27 | 3.97% |
| Households | 59,521 | 62,704 | 3,183 | 5.35% |
| Employment | 119,655 | 120,320 | 665 | 0.56% |
| Jobs/Acre | 5.15 | 5.18 | 0.03 | 0.56% |

Source: MWCOG Round 6.2 Forecasts (Baseline Alternative data only), 2025 With BRT by Capital Transit Consultants.

**Dulles Airport.** No changes in land use or development intensity are anticipated at Dulles Airport based on the implementation of Alignment BRT 3. No changes to population, housing, and employment are expected to result.

**Loudoun County.** The *Loudoun County Revised General Plan* allows for increased development intensity based on the implementation of Alignment BRT 3, which, as shown in Table 3.1-11, is projected to have a small impact on population, housing, and employment in the Loudoun County section of the corridor.

**BRT Maintenance and Storage Facility.** The land use impacts of the BRT Maintenance and Storage Facility for BRT 3 would be the same as those for BRT 1.

#### 3.1.3.3 Metrorail Alternative

The Metrorail Alternative is consistent with the *Fairfax County Comprehensive Plan* and the *Loudoun County Revised General Plan*, which discuss the potential for BRT or Metrorail service in the corridor. The Metrorail Alternative is consistent with existing and future land uses in the corridor. A mix of existing land uses along the corridor and several major activity centers could support transit, particularly in Fairfax County. By 2025, the land use mix would remain generally the same, although intensities would increase and new land uses would be created as Loudoun County develops and converts currently undeveloped land to industrial, office, and residential uses.

Because the Metrorail Alternative would be constructed primarily within existing transportation rights-of-way, there would be little conversion of land uses. The addition of Metrorail within an existing transportation land use would not create a conflict with surrounding land uses, as those surrounding land uses are already located adjacent to existing transportation facilities. The presence of rail within already defined transportation corridors would be consistent with existing and future land uses.

#### Orange Line Connection

Because the Metrorail Alternative's location is entirely within the Dulles Connector Road and existing road rights-of way, no land use conversion is expected. The *Fairfax County Comprehensive Plan* does not call for changes in land use or development intensity based on the implementation of the Metrorail Alternative in this area. No changes to population, housing, and employment would occur.

#### Tysons Corner

The Tysons Corner area includes analysis of Metrorail Alignment options (T1, T6, T9, T9 Design Option, and T4), and three to six rail stations depending on alignment. Each alignment's design would have specific impacts to land use for the provision of station facilities, such as station platforms, touchdowns, bus bays, and Kiss & Ride and park-and-ride facilities.

Rapid rail service through the Tysons Corner Urban Center is part of the *Fairfax County Comprehensive Plan*, so any of the alignments would be consistent with the plan. However, the plan does include a route alignment that does not include the configuration proposed in Alignment T4. The route depicted in the Comprehensive Plan was determined prior to the consideration of Alignment T4 as one of the alignments in Tysons.

The *Fairfax County Comprehensive Plan* allows for development density bonuses based on the proximity of the development parcel to a Metrorail station. This increased density would have an effect on both population and employment in Tysons Corner. The current *Comprehensive Plan* assumes that the ultimate configuration of rapid rail in Tysons Corner reflects that of Alignments T1, T6, T9, and T9 Design Option.

**Alignment T1.** Alignment T1 would include three stations: Tysons East, Tysons Central, and Tysons West. The Tysons East Station would require the conversion of undeveloped land north of Route 123 for the station platform and on the south side for the station touchdown, bus bays, and Kiss & Ride facilities. On the south side this land has previously been designated and proffered for this use.

The Tysons Central Station would require the conversion of undeveloped, land north of Route 123 for the station platform and touchdown. On the south side, the station pedestrian entrance and bus bays would require the conversion of approximately 30 parking spaces and approximately one-half acre of landscaping at the Tysons Corner Center shopping mall.

The Tysons West Station platform would be elevated above the Route 7 service road and would not require the conversion of any existing land uses. The entrance pavilion, however, would require conversion of approximately 20 parking spaces at the 8601 Westwood Center Drive office building. The transfer facilities and park-and-ride lot would require acquisition of two commercial properties, the Templeton Dodge/Chrysler automobile dealership and Security Moving and Storage. In addition, a partial acquisition of private land would be required because access to another storage facility, located behind the Tysons West Station, would be eliminated. New access to this facility would be provided via the station entrance on Tyco Road. Table 3.1-14 shows that Alignment T1, in conjunction with density bonuses, could generate an increase in employment of over 12 percent in Tysons Corner, with 13 and 12 percent increases in population and households, respectively. As stated earlier, all projections are prepared for planning purposes and would occur if acreages within proximity to the transit stations were converted according to the densities allowed in the Comprehensive Plan.

**Table 3.1-14: Tysons Corner Population and Employment with Metrorail Alternative, Alignment T1**

| | 2025 Baseline | 2025 With Rail | Total Change | Percent Change |
|---|---|---|---|---|
| Population | 18,920 | 21,296 | 2,376 | 12.56% |
| Persons/Acre | 8.39 | 9.45 | 1.06 | 12.56% |
| Households | 9,652 | 10,810 | 1,158 | 11.99% |
| Employment | 125,991 | 141,539 | 15,548 | 12.34% |
| Jobs/Acre | 55.90 | 62.79 | 6.90 | 12.34% |

Source: MWCOG Round 6.2 Forecasts (Baseline Alternative data only), 2025 Rail data by Capital Transit Consultants.

**Alignments T6 and T9.** Alignments T6, T9 and T9 Design Option would include the Tysons East, Tysons Central, and Tysons West stations, the same as described for Alignment T1, plus one additional station, Tysons Central C. For Alignment T6, this would be an underground station located along Leesburg Pike near Pike 7 Plaza, with entrance pavilions on both sides of Route 7. The south entrance pavilion would be located within the parking lot for the Tysons Square Center shopping center and would require the conversion of 35

parking spaces. The north entrance pavilion, located north of Route 7, would require the acquisition of two business properties, the Merchant's Tire and Auto building and the Business Bank building, at the corner of Gosnell Drive and Leesburg Pike (Route 7). In addition, ventilation and emergency equipment shafts would be added to the sidewalks along the side of Route 7 above the station. A partial acquisition may be needed in this area.

Alignment T9 and the T9 Design Option would include the Tysons East, Tysons Central, Tysons Central C, and Tysons West stations. The Tysons East and Tysons West stations would be identical to those discussed for Alignment T1. The Tysons Central C Station under Alignment T9 and T9 Design Option would be an aerial, side-platform station that spans the Route 7 access road, with entrance pavilions on both sides of Route 7. The south entrance pavilion would be located within the parking lot for the Tysons Square Center shopping center and would require conversion of approximately 45 parking spaces. The north entrance pavilion, located across Route 7, would require acquisition of one business property, the Merchant's Tire and Auto building.

The Tysons Central Station under Alignment T9 and the T9 Design Option would have a side-platform station located approximately 200 feet east of the Tysons Central Station proposed for Alignment T1. It would require conversion of undeveloped land north of Route 123 for the station platform and touchdown. On the south side, the station touchdown and bus bays would require the conversion of approximately 30 parking spaces and approximately one-half acre of landscaped land at the Tysons Corner Center shopping mall.

Table 3.1-15 shows that the Tysons Corner Alignments T6 or T9, in conjunction with density bonuses, could have a moderate impact on both population and employment in Tysons Corner, with 34 percent and 14 percent increases, respectively. The increase in population with Alignment T6 would be a result of provisions in the *Fairfax County Comprehensive Plan* for increased residential density along Route 7 near Tysons Central C Station, based on the implementation of rapid rail transit.

**Table 3.1-15: Tysons Corner Population and Employment with Metrorail Alternative, Alignments T6 or T9, or T9 Design Option**

| | 2025 Baseline | 2025 With Rail | Total Change | Percent Change |
|---|---|---|---|---|
| Population | 18,920 | 25,393 | 6,473 | 34.21% |
| Persons/Acre | 8.39 | 11.27 | 2.88 | 34.21% |
| Households | 9,652 | 12,928 | 3,276 | 33.94% |
| Employment | 125,991 | 143,708 | 17,717 | 14.06% |
| Jobs/Acre | 55.90 | 63.76 | 7.86 | 14.06% |

Source: MWCOG Round 6.2 Forecasts (Baseline Alternative data only), 2025 Rail data by Capital Transit Consultants

**Alignment T4.** Alignment T4 would include the Tysons East and Tysons West Stations, as described for Alignments T1, T6, T9, and T9 Design Option. The potential land use impacts at these stations would be the same as those described for Alignment T1. Alignment T4 would replace the Tysons Central Station with separate westbound and eastbound alignments and four aerial stations: Tysons Central A, Tysons Central B, Tysons Central C, and Tysons Central D. The Tysons Central A Station, located along Westpark Drive between Jones Branch Drive and Westbranch Drive, would be placed on bents above the roadway. The entrance pavilion for the Tysons Central A Station would be located in the parking lot of the Essex building within the West*Park development and would require conversion of approximately 15 parking spaces.

The Tysons Central B Station would be located near the intersection of Westpark Drive and International Drive. The platform would be located primarily above Westpark Drive and elevated on bents. The entrance

pavilion would be located on approximately one-half acre of undeveloped land that is planned for mixed-use development adjacent to the Lincoln Apartments.

The Tysons Central C Station, located along Leesburg Pike near the Pike 7 Plaza, would be an aerial station, with entrance pavilions on both sides of Route 7. The south entrance pavilion would be located within the parking lot for the Tysons Square Center shopping center and would require the conversion of approximately 70 parking spaces. The north entrance pavilion would be located across Route 7, and would require acquisition of one commercial property, the Merchant's Tire and Auto building.

The Tysons Central D Station, located 200 feet east of the proposed Tysons Central Station under Alignment T1, would require the conversion of undeveloped, proffered land north of Route 123 for the station platform and entrance pavilion. On the south side, the station touchdown and bus bays would require the conversion of approximately 30 parking spaces and approximately one-half acre of landscaping at the Tysons Corner Center shopping mall.

Because Alignment T4 has the most stations, it would provide the greatest opportunity for increased development intensities allowed by the density bonuses, and, therefore, could generate the largest increase in population, housing, and employment. Table 3.1-16 shows that Alignment T4 could generate an approximate 46 percent increase in population and 16 percent increase in employment in Tysons Corner. The large increase in population associated with Alignment T4 would be the result of provisions in the *Fairfax County Comprehensive Plan* for increased residential density based on implementation of rapid rail transit along Westpark Drive near the Tysons Central A and Tysons Central B stations and along Route 7 near Tysons Central C Station. For the purposes of this analysis, the land was converted at the rate allowed under the Comprehensive Plan, assuming that market conditions would be as strong for station areas such as those included in Alignment T4 that provide access to only one direction. It should be noted that these projections are likely a worst-case scenario. In order for this level of development to occur in Tysons, many conditions would have to be met, including provisions for high levels of transit usage that could be difficult to obtain with one-way stations.

**Table 3.1-16: Tysons Corner Population and Employment with Metrorail Alternative, Alignment T4**

| | 2025 Baseline | 2025 With Rail | Total Change | Percent Change |
|---|---|---|---|---|
| Population | 18,920 | 27,807 | 8,887 | 46.97% |
| Persons/Acre | 8.39 | 12.3 | 3.943 | 46.97% |
| Households | 9,652 | 13,854 | 4,202 | 43.54% |
| Employment | 125,991 | 146,455 | 20,464 | 16.24% |
| Jobs/Acre | 55.90 | 64.98 | 9.079 | 16.24% |

Source: MWCOG Round 6.2 Forecasts (Baseline Alternative data only), 2025 Rail data by Capital Transit Consultants.

### Mid-Corridor

The anticipated land use effects for the Metrorail Alternative would be the same as those discussed for the BRT 1 alignment, because the stations facilities would be almost identical.

The changes in allowable density and mix of uses associated with implementation of the Metrorail Alternative could modify the population, housing, and employment estimates for the stations in this area (Wiehle Avenue, Reston Parkway, Herndon-Monroe, and Route 28). The *Fairfax County Comprehensive Plan* allows for development density bonuses based on the proximity of the development parcel to a Metrorail station. The projected result of these bonuses, shown in Table 3.1-17, would be a 17 percent increase in population and a 27 percent increase in employment.

**Table 3.1-17: Mid-Corridor Population and Employment with Metrorail Alternative**

| | 2025 Baseline | 2025 With Rail | Total Change | Percent Change |
|---|---|---|---|---|
| Population | 158,376 | 184,900 | 26,524 | 16.75% |
| Persons/Acre | 6.81 | 7.95 | 1.14 | 16.75% |
| Households | 59,521 | 72,463 | 12,942 | 21.74% |
| Employment | 119,655 | 152,825 | 33,170 | 27.72% |
| Jobs/Acre | 5.15 | 6.57 | 1.43 | 27.72% |

Source: MWCOG Round 6.2 Forecasts (Baseline Alternative data only), 2025 Rail data by Capital Transit Consultants.

### Dulles Airport

The Metrorail alignment and the station would be located underground through this section. No changes in land use or development intensity are anticipated based on the implementation of the Metrorail Alternative at Dulles Airport. No changes in population, housing, or employment are expected to result from the implementation of the Metrorail Alternative.

### Loudoun County

The Loudoun County section of the Metrorail Alternative would place Metrorail tracks in the median of the Dulles Greenway and would include two stations in the vicinity of Route 606 and Route 772. The Route 606 Station would convert land that is undeveloped. Two options are proposed at the Route 772 location, both of which would convert undeveloped land to transit facilities. The station facilities at Route 772 might be part of a future proffer arrangement associated with the Moorefield Station development now being considered by Loudoun County.

Loudoun County has indicated that construction of the Metrorail Alternative and support facilities, as currently planned, is consistent with its *Revised General Plan*. However in adopting the plan on July 23, 2001, the Board of Supervisors expressed its desire that the Route 772 Station and the rail alignment be located south of the Dulles Greenway.

The *Loudoun County Revised General Plan* allows for increased development intensity based on the implementation of the Metrorail Alternative, which, as shown in Table 3.1-18, is projected to have only a small impact on population, housing, and employment in Loudoun County.

**Table 3.1-18: Loudoun County Population and Employment with Metrorail Alternative**

| | 2025 Baseline | 2025 With Rail | Total Change | Percent Change |
|---|---:|---:|---:|---:|
| Population | 144,634 | 147,613 | 2,979 | 2.06% |
| Persons/Acre | 4.64 | 4.74 | 0.10 | 2.06% |
| Households | 52,514 | 53,706 | 1,192 | 2.27% |
| Employment | 126,252 | 138,087 | 11,835 | 9.37% |
| Jobs/Acre | 4.05 | 4.43 | 0.38 | 9.37% |

Source: MWCOG Round 6.2 Forecasts (Baseline Alternative data only), 2025 Rail data by Capital Transit Consultants

### Metrorail S&I Yard

Three sites (Sites 7, 15, and 20) are potential Metrorail S&I Yard Sites. Site 7 is currently undeveloped. According to Loudoun County, the site is anticipated for development that would be within the Transit-Related Employment Center (TREC) boundary and the Keynote Employment District. However, this land is currently zoned industrial.

According to the MWAA land use plan, Site 15's current and future planned land use is as a buffer zone. Additionally, a portion of this land is within the runway protection zone for a future runway that would be located to the south of the site. The implementation of an S&I Yard on MWAA property would require MWAA Board action to amend the land use plan and to waive MWAA's policy regarding development in runway protection zones. Sites proposed on MWAA property would also be subject to review by the FAA. FAA has indicated that the conversion of land from airport use to an S&I Yard is undesirable to them.

According to the *Loudoun County Revised General Plan*, the land proposed for Site 20 is currently planned for Planned Development General Industrial (PDGI). According to the Loudoun County Department of Planning, there is a preliminary application for a subdivision approved. The plat submitted for the first phase of the project in inactive.

#### 3.1.3.4 BRT/Metrorail Alternative

The effects of this alternative would be the same as those identified above for the Metrorail Alternative in the Orange Line Connection and Tysons Corner sections of the study area. In the Mid-Corridor, Dulles Airport, and Loudoun County sections of the study area, the effects would be identical to those identified above for the BRT Alternative, except that the BRT/Metrorail Alternative would require a direct ramp for BRT buses to enter the DAAR, which would require approximately one-quarter acre of undeveloped land at the Tysons Self Storage facility.

#### 3.1.3.5 Phased Implementation Alternative

In accordance with the *Fairfax County Comprehensive Plan* and *Loudoun County Revised General Plan*, the allowable density bonuses for Metrorail would apply. As a result, the effects of the Phased Implementation Alternative would be identical to those discussed above for the Metrorail Alternative, with the following exceptions. Phased implementation of BRT to Metrorail would also require the acquisition of property for the Spring Hill Road BRT Station and direct ramps between the DAAR and Tysons West Station. This land would become available again for non-transit development purposes after these facilities are removed. In addition, the BRT Maintenance and Storage Facility could be located at Site 14, a BRT only facility, or Site 20, where Site 17 could be combined with a Metrorail S&I Yard. If Site 14 were selected additional land would be acquired and up to two additional displacements would occur over those identified above for the Metrorail Alternative.

### 3.1.4 CONSTRUCTION EFFECTS

Construction activities associated with each alternative would be controlled by WMATA contract specifications and would comply with all applicable local, state, and federal standards. These specifications would include provisions to protect adjacent communities from impacts anticipated during construction. Construction times would be limited to normal, daytime shifts (except where such construction activities jeopardize transit operations, airport operations, or traffic operations) to limit any noise and light impacts on surrounding residential or sensitive land uses. During the final design phase of this project, truck routes would be defined that minimize any interaction with sensitive land uses such as residential areas or community facilities.

#### 3.1.4.1 Baseline Alternative

The Baseline Alternative is not anticipated to result in construction-related impacts to population, housing and employment. However, some effects to population, housing, or employment could occur as a result of some of

the projects assumed under this alternative. Identification of these effects would be the responsibility of the agencies and jurisdictions implementing the improvements.

#### 3.1.4.2 BRT Alternative

There would be no construction effects to land uses associated with the implementation of the BRT Alternative. There could be temporary uses of land along the corridor only associated with construction staging areas of the median stations, but this effect would be minimal.

Construction activities associated with the BRT Alternative would not result in impacts to population or housing. Construction would generate short-term employment opportunities. The number of person-years of jobs that could be created is described in Section 5.1.

#### 3.1.4.3 Metrorail Alternative

There could be temporary uses of land along the corridor only associated with construction staging areas of the stations, but this effect would be minimal. Temporary uses of land could also be required for the construction of the Metrorail Alternative through Tysons Corner and Dulles Airport.

Construction associated with the Metrorail Alternative would not result in impacts to levels of population or create a need for housing. Construction would generate short-term employment opportunities. The number of person-years of jobs that could be created by construction of the Metrorail Alternative is described in Section 5.1.

#### 3.1.4.4 BRT/Metrorail Alternative

The construction impacts of the underground alignment in Tysons Corner, if T1, T6, T9 or the T9 Design Option were selected, would be the same as those described for the Metrorail Alternative.

Construction activities associated with the BRT/Metrorail Alternative would not result in impacts to population or housing. Construction would generate short-term employment opportunities. The number of person-years of jobs that could be created by construction of the BRT/Metrorail Alternative is described in Section 5.1.

#### 3.1.4.5 Phased Implementation Alternative

Construction of this alternative would involve the implementation of BRT and Metrorail over an extended period of time. Although the construction effects would be the same as those of the other three alternatives, the timing of the effects would be different. The effects of constructing Metrorail through Tysons Corner would add to the effects of constructing BRT between the Orange Line and Loudoun County. These effects would then be followed by effects of constructing Metrorail from Tysons Corner to the end of the study area in Loudoun County.

### 3.1.5 MITIGATION

Examples of available mitigation for long term effects include: design features at transit station areas that will be compatible with existing and planned land uses; replacement parking; and comprehensive landscaping and buffering throughout the corridor. Available mitigation strategies during construction include: truck access and circulation planning; lighting control plans; and best management practices.

No mitigation would be required for the changes in population, housing and employment. The effects of this new development within the corridor are assessed in Chapter 9.

### 3.1.6 SUMMARY OF EFFECTS

A summary of the land use effects is presented in Table 3.1-19.

**Table 3.1-19: Summary of Land Use Effects**

| Alternative | Consistent with comprehensive plans? | Conversion of land use? | Increase in station area population over Baseline[1] | Increase in station area employment over Baseline[1] | Mitigation |
|---|---|---|---|---|---|
| Baseline | No | No | — | — | — |
| BRT 1 | Somewhat | Yes | 24,496 | 26,756 | — |
| BRT 2 | No | Yes | 15,984 | 7,972 | — |
| BRT 3 | No | Yes | 7,399 | 2,474 | — |
| Metrorail T1 | Yes | Yes | 31,879 | 60,554 | — |
| Metrorail T6 | Yes | Yes | 35,976 | 62,723 | — |
| Metrorail T9 | Yes | Yes | 35,976 | 62,723 | — |
| Metrorail T4 | Yes | Yes | 38,390 | 65,470 | — |
| BRT/Metrorail | Yes | Yes | 26,872 - 33,383 | 52,331 – 57,247 | — |
| Phased Implementation | Yes | Yes | 31,879 – 38,390 | 60,554 – 65,470 | — |

1 Population and employment potential calculated for areas within ½ mile radius of proposed stations except where a 1,600-foot radius was used. Changes added to totals for all Traffic Analysis Zones in corridor.

## 3.2 NEIGHBORHOOD, COMMUNITY SERVICES, AND COMMUNITY COHESION IMPACTS

### 3.2.1 METHODOLOGY

Sources of information about neighborhoods and community facilities included Fairfax and Loudoun county governments, field surveys, and U.S. Census data. Changes in neighborhoods and community facilities were identified through review of comprehensive plans, real estate development proposals, and through coordination with Fairfax and Loudoun county officials and local community organizations as needed.

Neighborhoods within 300 feet of the centerline of the Build Alternative alignments and within one half-mile of the proposed station areas were identified for evaluation. In addition to the community facilities within these neighborhoods, a few facilities located outside of these boundaries that serve the neighborhoods were evaluated. This area was determined after a review of the anticipated limits of disturbance for the proposed improvements. Furthermore, this area was also reviewed after the noise, vibration, and air quality effects (discussed in Chapter 4) were available and several additional neighborhoods and community facilities were added to the study area. This section discusses potential impacts to neighborhoods, social groups, community services, and community cohesion in the study area defined for the Dulles Corridor Rapid Transit Project.

Impacts to neighborhoods, communities and community services were assessed using techniques described in the *Federal Highway Administration's Community Impact Assessment: A Quick Reference for Transportation*. Areas of assessment and their effects on communities include:

- changes in population and employment;
- community cohesion and interaction;
- isolation effects;
- social values – social groups benefited or harmed;
- barrier effects;
- noise and vibration;
- physical intrusions – dust, odor, light;
- access changes – bicycle, pedestrian, transit, and vehicular;
- community facility impacts;
- displacements;
- safety – pedestrian and bicyclists, crime, and emergency response; and
- property values.

In many cases, details on specific impacts, such as noise and vibration, traffic access, and property value impacts are detailed in other sections of this Draft EIS. In this section, overall impacts to the communities within the corridor are assessed. This assessment also addressed the requirements of Executive Order 13045. Executive Order 13045, entitled *Protection of Children from Environmental Health Risks,* requires federal agencies, as part of their programs and policies, to consider such risks and ensure that federal standards take into account special risks to children. Profiles of the study area were prepared to identify the presence of social groups and persons over the age of 65 or less then 18 years old. There were no concentrations of those social groups identified in the study area.

### 3.2.2 EXISTING CONDITIONS

The Dulles Corridor includes neighborhoods within Fairfax and Loudoun counties, as well as the Town of Herndon. Many of the neighborhoods are located close to the Dulles Connector Road, the DAAR, and Dulles Toll Road, particularly in the Orange Line Connection and Mid-Corridor segments. In Tysons Corner, Reston, and Loudoun County, the neighborhoods studied are generally located within the half-mile radii for the station areas.

#### 3.2.2.1 Neighborhood Characteristics

The locations of the neighborhoods discussed in this section are illustrated in Figure 3.2-1 (a-f).

**Orange Line Connection**

The neighborhoods located in the Orange Line Connection are shown in Figure 3.2-1a.

**The Pavilion.** This owner-occupied townhouse and condominium complex is situated between the West Falls Church Metrorail Station to the north and Haycock Road to the south. George Mason High School is

adjacent to this neighborhood. Falls Reach Drive, which runs perpendicular to Haycock Road, is the main access road for the neighborhood.

**Westhampton.** This single-family neighborhood is located east of the Dulles Connector Road and northeast of I-66. The only community facility located within Westhampton is the Church of Latter Day Saints. Access to this neighborhood is via Great Falls Street.

**Idylwood.** This development, completed in 2001, is located west of the Dulles Connector Road. The mix of single-family homes in this neighborhood includes a new subdivision of luxury homes called Brookside Manor. Community facilities in the neighborhood include the Lemon Road Elementary School and Mount Royal Park, both located on Idylwood Road. Pimmit Run Stream Valley Park is adjacent to this neighborhood. Access to the neighborhood is via Idylwood Road.

**Great Falls Manor.** The single-family neighborhood of Great Falls Manor is located east of the Dulles Connector Road. Tuckahoe Recreation Club is located within the boundaries of this neighborhood. Pimmit Run Stream Valley Park runs through the southern portion of the neighborhood and the Our Small World Child Center is at its northern boundary. Access to the neighborhood is via Great Falls Street. Most of the streets within the neighborhood have cul-de-sacs that limit traffic movement through the neighborhood.

**Pimmit Hills.** Pimmit Hills is a large, single-family neighborhood located west of the Dulles Connector Road, with several homes bordering the road. Olney Park is located east of Pimmit Hills and Pimmit View Park is located within the neighborhood. Pimmit Hills was developed on a grid street system, with several streets providing access to Route 7 to the west and to Magarity Road to the north. Through traffic is limited because most of the local residential roads do not provide access to other major arterials.

**McLean Ridge**. Still under construction, McLean Ridge is a small townhouse complex bordered by the Dulles Connector Road on the east, Magarity Road on the south, and Chain Bridge Road on the north. No community facilities are located within this neighborhood. Magarity Road provides access to McLean Ridge.

**Hunting Ridge.** The Hunting Ridge neighborhood is a small, single-family community located adjacent to and on either side of the Dulles Connector Road. Access to the neighborhood is via Great Falls Street and Chain Bridge Road as it passes under the Dulles Connector Road just south of the interchange with Route 123. No community facilities are located within this neighborhood.

**Hallcrest Heights.** The Hallcrest Heights neighborhood is located in the southeast quadrant of the Dulles Connector Road/Route 123 interchange, immediately west of the Hunting Ridge neighborhood. Access to the neighborhood is provided from Chain Bridge Road and Great Falls Street.

**Tysons Corner.** The Tysons Corner section of the Dulles Corridor includes the entire core area of Tysons Corner. Neighborhoods in this section are shown in Figures 3.2-1a and 3.2-1b.

**The Westerlies.** The Westerlies is located just north of Magarity Road, near the Dulles Connector Road, and is comprised of townhouses. Access to this small neighborhood is via Magarity Road. No community facilities are located within this neighborhood.

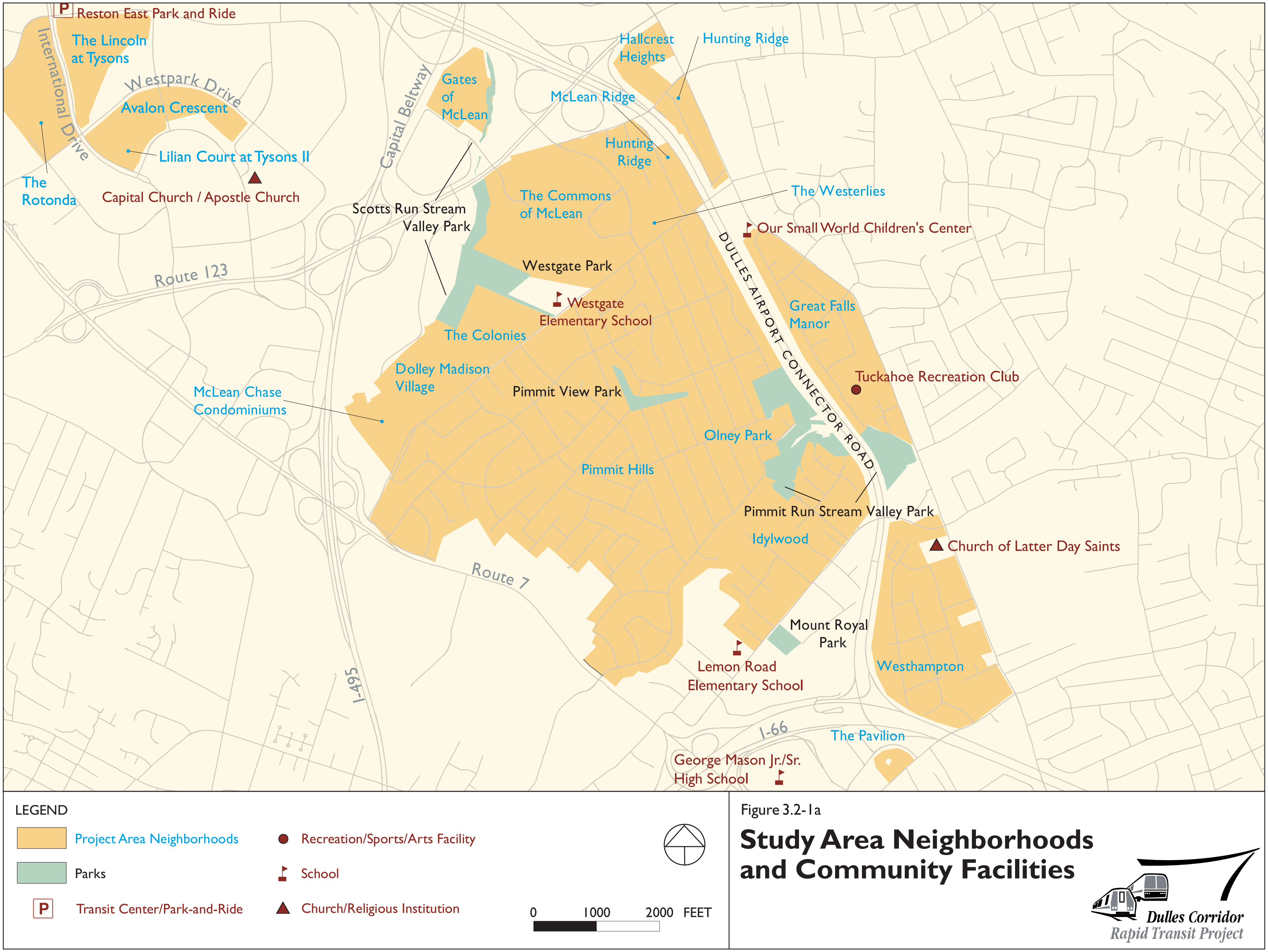



Figure 3.2-1a

# Study Area Neighborhoods and Community Facilities

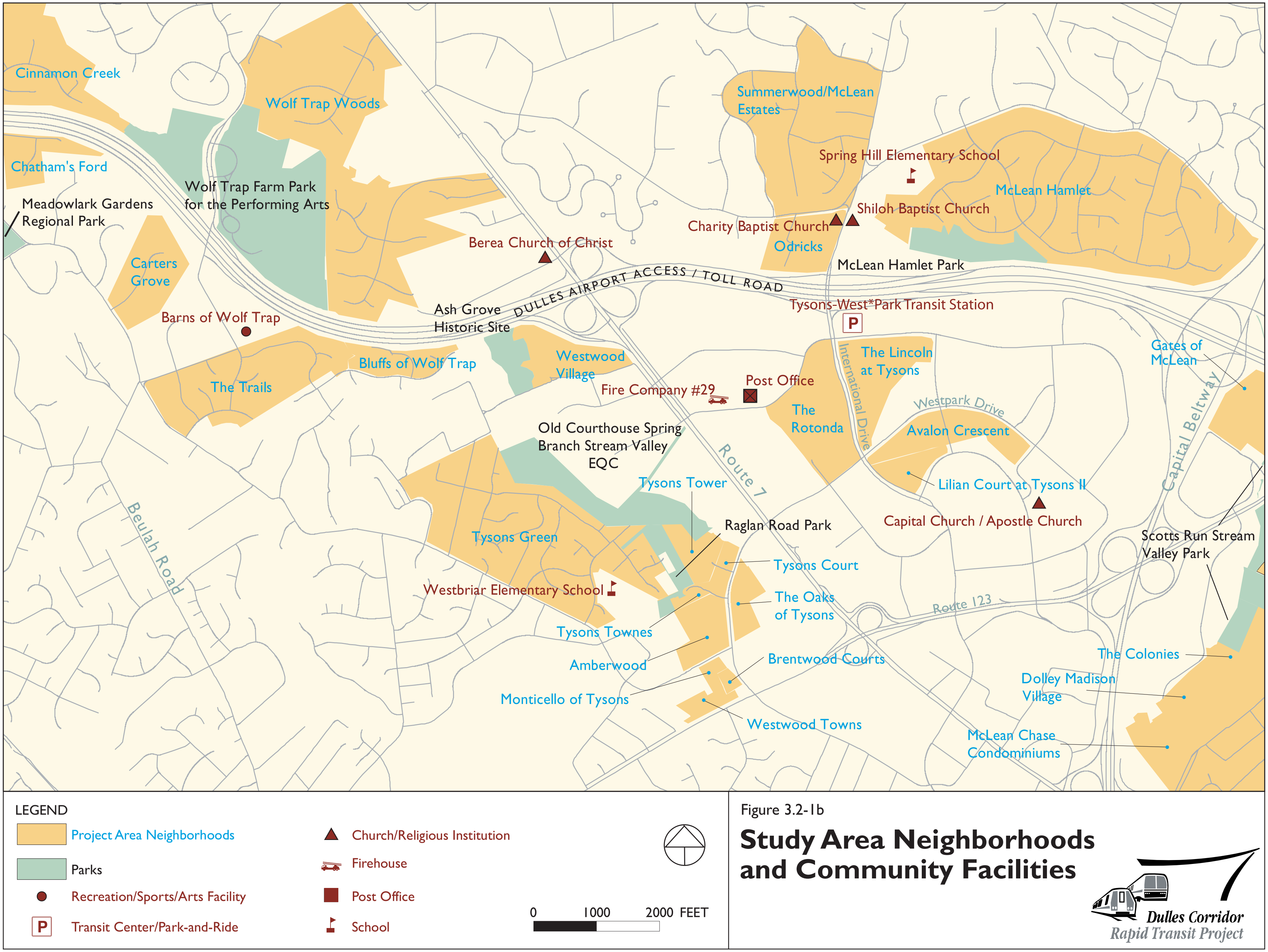



Figure 3.2-1b

## Study Area Neighborhoods and Community Facilities

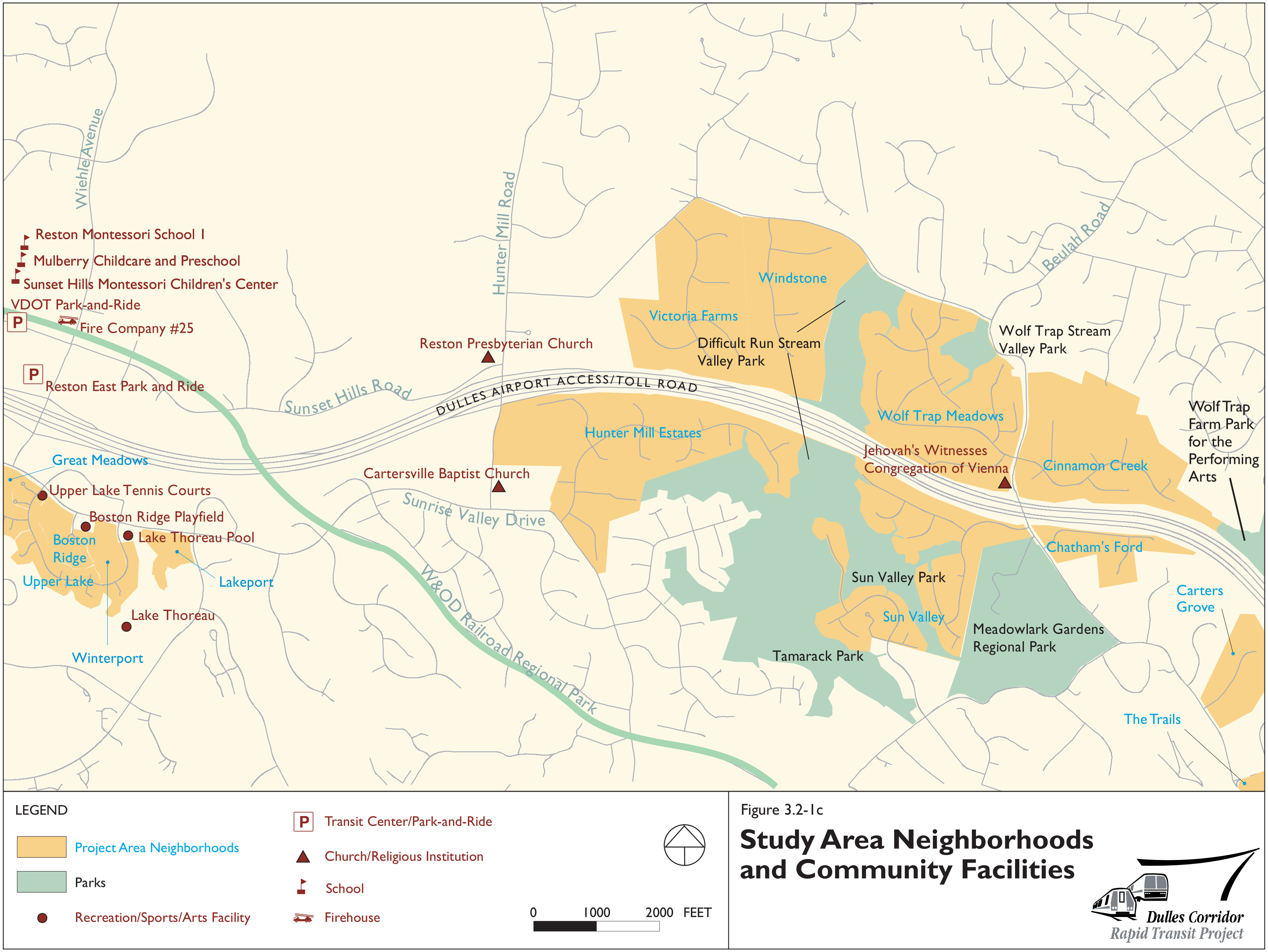



Figure 3.2-1c

## Study Area Neighborhoods and Community Facilities


LEGEND

Project Area Neighborhoods

Parks

Recreation/Sport/Arts Facility

P Transit Center/Park-and-Ride

School

0 1000 2000 FEET

Figure 3.2-1d

# Study Area Neighborhoods and Community Facilities

Dulles Corridor Rapid Transit Project

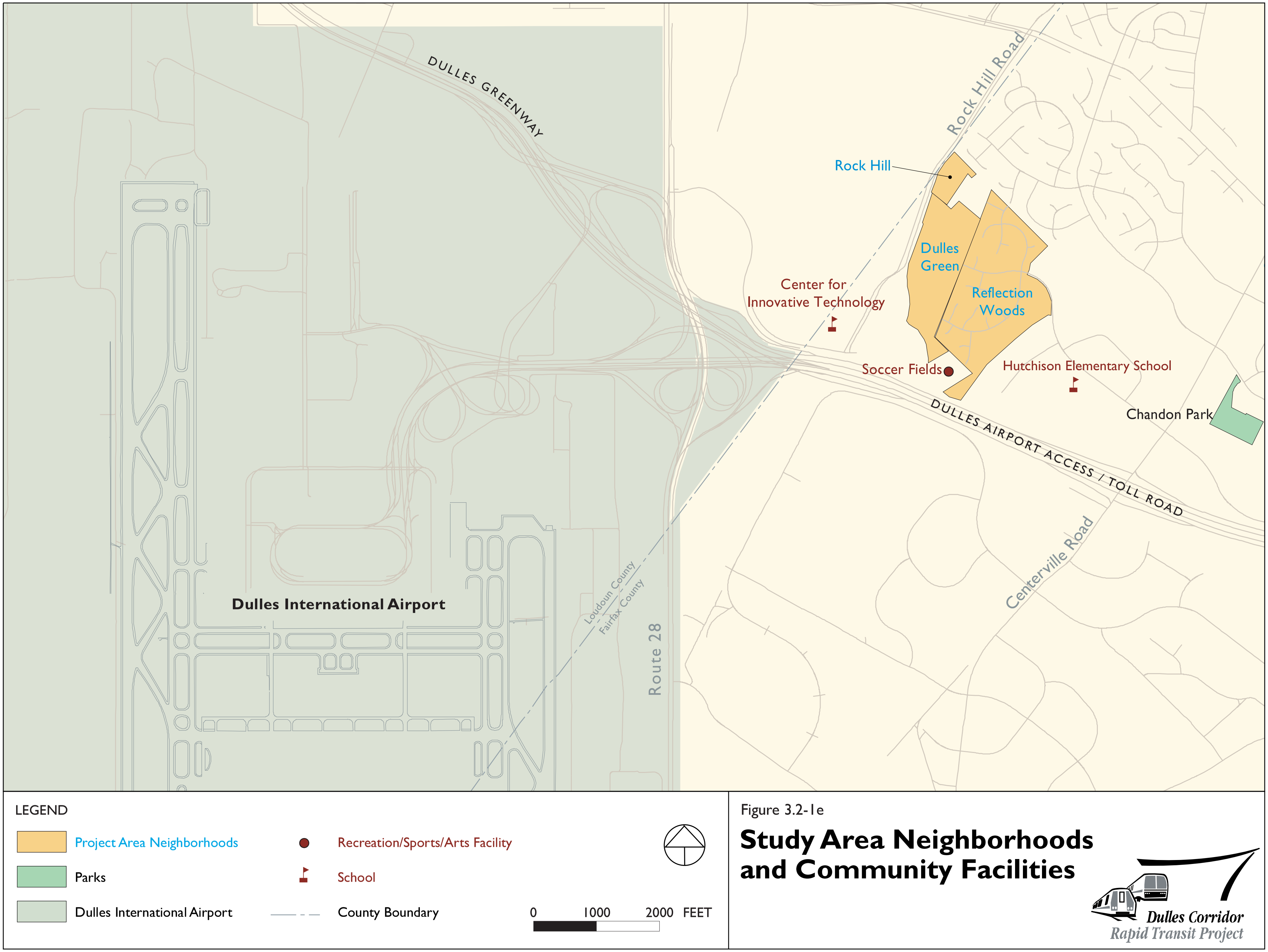



Figure 3.2-1e

## Study Area Neighborhoods and Community Facilities

Dulles Corridor
Rapid Transit Project

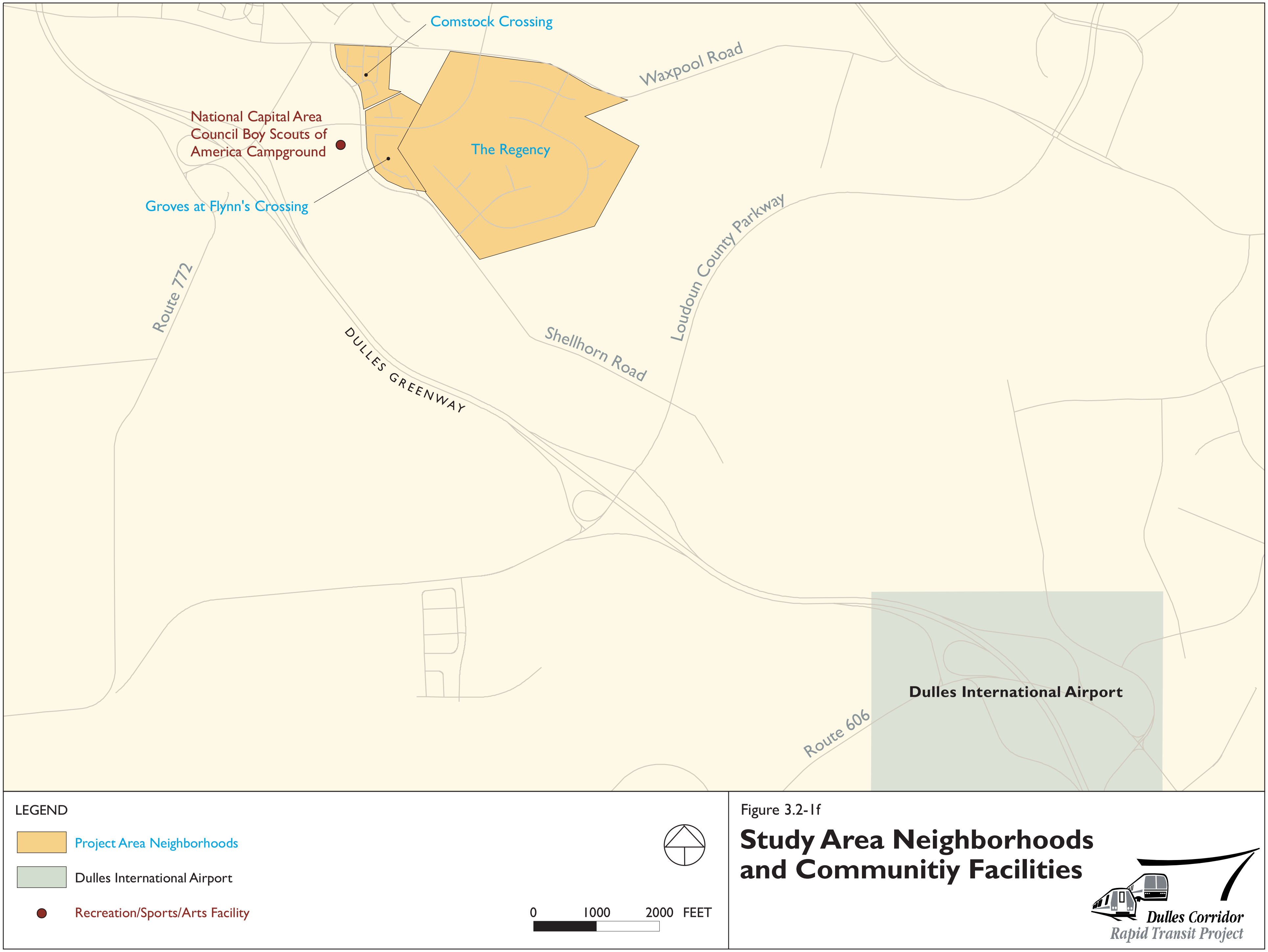



Figure 3.2-1f

# Study Area Neighborhoods and Communitiy Facilities

Dulles Corridor
Rapid Transit Project

**The Commons of McLean.** The Commons of McLean is a townhouse and apartment complex located northwest of Magarity Road and south of Chain Bridge Road. Access to this neighborhood is from Magarity Road, Chain Bridge Road, and Anderson Road. A shopping center is part of the development. Westgate Park and Westgate Elementary School are adjacent to this neighborhood.

**Gates of McLean.** Located on Spring Gate Drive between I-495 and Route 123, the Gates of McLean apartment complex includes a pool, fitness center, spa, and clubhouse. The neighborhood can be accessed from two points on Chain Bridge Road.

**The Colonies.** The Colonies is a small condominium development located off Magarity Road. The Colonies consists of 12 buildings, a pool, tennis courts, and a community center. Access is provided via Magarity Road. Westgate Park is east of The Colonies.

**Dolley Madison Village and McLean Chase Condominiums.** The Dolley Madison apartments and McLean Chase condominiums include three-story garden apartment buildings and a pool. Access to both complexes is from Magarity Road. The two developments are located close to the Route 123/I-495 interchange. No community facilities are located within these small neighborhoods.

**McLean Hamlet.** McLean Hamlet is a large, single-family residential neighborhood located north of the DAAR and Dulles Toll Road, adjacent to Tysons Corner. It is generally bounded by the DAAR and Dulles Toll Road to the south, Lewinsville Road to the north, I-495 to the east, and Spring Hill Road to the west. Community facilities include McLean Hamlet Park located along the southern edge of the neighborhood, and Spring Hill Elementary School adjacent to the neighborhood. Access to the neighborhood is provided by Lewinsville Road, which runs parallel to the DAAR and Dulles Toll Road and provides connections to north-south neighborhood collector roads.

**Odricks.** The Odricks subdivision is a small, single-family, cul-de-sac neighborhood located north of the DAAR and Dulles Toll Road and south of Lewinsville Road. The neighborhood includes Charity Baptist Church and Shiloh Baptist Church. Access is from Lewinsville Road.

**Summerwood and McLean Estates.** The single-family neighborhoods of Summerwood and McLean Estates are located north of the DAAR and Dulles Toll Road. They are bordered by Lewinsville Road to the south and Spring Hill Road to the east. These neighborhoods are located at the edge of the study area with access via Lewinsville Road and Spring Hill Road. The portions of the subdivisions that lie within the study area are primarily cul-de-sac streets located north of the Odricks community. No community facilities are within these neighborhoods.

**The Lincoln at Tysons.** This garden apartment complex is located in the southeast quadrant of the International Drive and Jones Branch Drive intersection, directly across Jones Branch Drive from the existing Tysons-West*Park Transit Station. Facilities include swimming pools, courtyards, tennis courts, and basketball courts. Access is from Jones Branch Drive or International Drive.

**Avalon Crescent.** This is a gated, access-controlled apartment complex with one- and two-bedroom garden apartments and townhouses, located at the intersection of Park Run Drive and Westpark Drive. The Avalon Crescent facilities include a pool and clubhouse facilities. Access is from Westpark Drive and Park Run Drive.

**Lillian Court at Tysons II.** This mix of townhouses and apartment-style condominiums is part of the Westpark townhouse/condominium community. Lillian Court is located at Park Run Drive and Tysons Boulevard. Amenities include a pool, clubhouse, and reserved parking. Access is from International Drive.

**The Rotonda.** This is a large condominium complex located in the northwest quadrant of the Westpark Drive and International Drive intersection in the core of Tysons Corner. The Rotonda consists of a gated community of five large condominium buildings. Resident facilities include on-site parking, tennis courts, swimming pools, a health spa, and other amenities. International Drive and Greensboro Drive provide two access points to the Rotonda.

**Tysons Tower.** Located on Spring Street, Tysons Tower is a retirement housing complex administered by the Fairfax Education Association. Rents at Tysons Tower are based on income, and rental assistance is provided to a number of the units. In addition, Tysons Towers provides housing for disabled persons over the age of 18. Access is provided via Gosnell Road. Raglan Road Park is located next to Tysons Tower.

**The Oaks of Tysons.** This complex of garden style apartments is located east of Gosnell Road. It includes amenities such as a swimming pool and on-site parking. Access to the apartments is from Gosnell Road.

**Tysons Court.** Tysons Court is a small townhouse complex located west of Gosnell Road. Access to the complex is from Gosnell Road. No community facilities are located in this neighborhood.

**Brentwood Courts, Monticello of Tysons, Tysons Townes, Westwood Towns, and Amberwood.** These small townhouse communities are located along Gosnell Road on the edge of Tysons Corner. The developments are mid-sized and dense, and are interspersed with commercial development. Access to these communities is from Gosnell Road and Route 123. No community facilities are located within any of these townhouse communities.

**Tysons Green.** This is a single-family neighborhood in the southwest portion of Tysons Corner, north of Old Courthouse Road. Tysons Green is located behind the commercial development fronting Route 7, on the edge of the study area. Access to the neighborhood is via Courthouse Road and Irwin Street. Three community facilities are located adjacent to Tysons Green: Raglan Road Park, Westbriar Elementary School, and the Old Courthouse Spring Branch Stream Valley Environmental Quality Corridor.

**Westwood Village.** This is a dense townhouse condominium community located west of Route 7 and Westwood Center Drive, and south of the DAAR and Dulles Toll Road. Access to Westwood Village is via Westwood Center Drive. No through routes are provided within the neighborhood. The Ash Grove Historic site is adjacent to this neighborhood.

### Mid-Corridor

The Mid-Corridor section of the Dulles Corridor begins at the Route 7/DAAR interchange and continues west to the Fairfax County line. Most of the corridor is comprised of single-family and multi-unit neighborhoods, with commercial developments interspersed in core areas. Most of the neighborhoods included within the Mid-Corridor section, from Route 7 to Hunter Mill Road, are directly adjacent to the DAAR and Dulles Toll Road. In Reston and Herndon, all of the neighborhoods, with the exception of the Worldgate development, are farther from the DAAR and Dulles Toll Road. In the Dulles Corner/Route 28 area, only

the Reflection Woods neighborhood includes units directly adjacent to the DAAR and Dulles Toll Road. These neighborhoods are shown in Figure 3.2-1b through 3.2-1e.

**Bluffs of Wolf Trap.** This is a small single-family neighborhood located south of the DAAR and Dulles Toll Road. The neighborhood has one primary street, Montmorency Drive, which is virtually parallel to the DAAR and Dulles Toll Road, and two cul-de-sacs. Access to the Bluffs is through the Trails neighborhood.

**The Trails.** This is a single-family neighborhood, with several parcels located in the study area, is south of the DAAR and Dulles Toll Road. Courthouse Road provides access to The Trails. No community facilities are located in this neighborhood.

**Wolf Trap Woods.** This single-family neighborhood is on the north side of the DAAR and Dulles Toll Road west of Route 7, adjacent to Wolf Trap Farm Park for the Performing Arts. Wolf Trap Woods consists of a series of cul-de-sac streets radiating from Route 7.

**Carters Grove.** This is single-family neighborhood located south of the DAAR and Dulles Toll Road, off Beulah Road, which provides access to the neighborhood. No community facilities are located within Carters Grove.

**Cinnamon Creek, Wolf Trap Meadows, Windstone, and Victoria Farms.** These single-family neighborhoods border the DAAR and the Dulles Toll Road on the north. These neighborhoods consist of cul-de-sac streets that feed onto Browns Mill Road or Beulah Road. Wolf Trap Stream Park and Difficult Run Stream Valley Park are located within Wolf Trap Meadows and Windstone. The Jehovah's Witnesses Congregation of Vienna is located in Wolf Trap Meadows.

**Chatham's Ford, Sun Valley, and Hunter Mill Estates.** These single-family neighborhoods border the DAAR and Dulles Toll Road on the south. All three neighborhoods consist of a series of cul-de-sac streets. Access to Chatham's Ford and Sun Valley is via Beulah Road, and access to Hunter Mill Estates is via Hunter Mill Road. Meadowlark Botanical Gardens is south of Chatham's Ford. Sun Valley Park is located within Sun Valley. Cartersville Baptist Church is located west of Hunter Mill Estates on Hunter Mill Road.

**Lakeport.** Lakeport is a Reston townhouse community located south of Sunrise Valley Drive, the DAAR, and Dulles Toll Road on Lake Thoreau. Access to the neighborhood is from Sunrise Valley Drive. No community facilities are within this small neighborhood.

**Upper Lake.** The single family neighborhood of Upper Lake is situated north of Lake Thoreau and south of the DAAR and Dulles Toll Road off Sunrise Valley Drive. The Lake Thoreau community pool, located east of the entrance to Upper Lake, is operated by the Reston Association. The Upper Lake Tennis Courts are also within the neighborhood. The neighborhood is accessed from two points on Sunrise Valley Drive; it has no through routes.

**Winterport and Boston Ridge.** These townhouse neighborhoods are located within the Upper Lake neighborhood, but are distinct "clusters," the term used in Reston for residential communities. Immediately west of Winterport is the neighborhood of Boston Ridge. An open recreation field is located at the entrance to Boston Ridge. Access to Winterport is off of Upper Lake Road south of its intersection with Sunrise Valley Drive. Access to Boston Ridge is via Sunrise Valley Drive.

**Great Meadows.** This single-family subdivision is located immediately north of Reston National Golf Course and south of Sunrise Valley Drive. Access to the neighborhood is from Sunrise Valley Drive.

**Wethersfield.** This is a small townhouse community located south of Sunrise Valley Drive to the west of its intersection with Wiehle Avenue. The neighborhood is west of Great Meadows. Access is provided by Sunrise Valley Drive. No community facilities are located within Wethersfield, but it is adjacent to the Reston National Golf Course.

**Hunters Green.** This neighborhood, located in the southwest quadrant of the intersection of Soapstone Road and Sunrise Valley Drive, is a small townhouse community surrounded on three sides by Reston National Golf Course. The only access to Hunters Green is from Soapstone Road.

**Newbridge.** This townhouse neighborhood, surrounded by Reston National Golf Course, is located south of the DAAR and Dulles Toll Road off Soapstone Road. A neighborhood recreational facility is within Newbridge. Access is from Soapstone Road.

**Indian Ridge.** This is a townhouse complex completely surrounded by Reston National Golf Course. Access is via Sunrise Valley Drive.

**South Gate.** Located east of Reston Parkway and south of Sunrise Valley Drive, at the edge of the study area, is the South Gate townhouse/apartment community. South Gate access is via Colts Neck Road and Reston Parkway. No community facilities are located within this neighborhood.

**Stratford.** This new residential development, located north of the DAAR and Dulles Toll Road, is being constructed on Reston Parkway across from Reston Town Center, and north of the W&OD Railroad Regional Park. The development includes several three- and four-story condominium buildings and one large multi-story condominium tower. Access is provided by Reston Parkway.

**West Market.** This condominium and townhouse development, completed in 2001, is located on the north side of the DAAR and Dulles Toll Road, west of the Reston Town Center and north of the W&OD Railroad Regional Park. West Market includes several types of units, including three- and four-story condominium units as well as townhouses. Access is via Town Center Parkway.

**Polo Fields.** This is a large single-family neighborhood on the south side of the DAAR and Dulles Toll Road. It is bordered by Fairfax County Parkway, Fox Mill Road, Monroe Street, and Sunrise Valley Drive, and is south of the Herndon-Monroe Park-and-Ride lot. Access is via Sunrise Valley Drive and Fox Mill Road. Most of the streets in the Polo Fields are cul-de-sacs. No community facilities are located within the neighborhood.

**The Downs.** Located north of the DAAR and Dulles Toll Road and bordered by Van Buren Street and Spring Street, The Downs subdivision is a predominantly single-family neighborhood. Haley Smith Park is adjacent to The Downs. Access is provided via Van Buren Street.

**President's Court.** This subdivision of single-family, two-story homes is located directly across from Haley Smith Park. Access is limited to Senate Court from Van Buren Street.

**Chandon Woods and Worldgate.** The Chandon Woods neighborhood is located north of the DAAR and Dulles Toll Road, and is comprised of single-family houses. Immediately south of Chandon Woods is the Worldgate development, a condominium complex located north of the Dulles Toll Road at Worldgate Drive. Access to Chandon Woods is via Herndon Parkway, and access to Worldgate is via Worldgate Drive. The Montessori Country School is located in these neighborhoods.

**Reflection Woods.** This neighborhood is located north of the DAAR and Dulles Toll Road and west of Elden Street in Herndon. The community is comprised of single-family homes accessed from Parcher Avenue. The two-story townhouse communities of Parcher Village and Lakeview, located north of Parcher Avenue, are generally considered part of Reflection Woods. Next to Reflection Woods is a soccer field, which is an interim use of land that has been committed for a future transit station.

**Dulles Green.** This gated-access garden apartment and townhouse complex is located around Astoria Circle. Rock Hill Road serves as the major access road to the community. Facilities include a swimming pool, tennis courts, a clubhouse, and a fitness center.

**Rock Hill.** This single-family condominium neighborhood is located around Capstone Circle, east of Rock Hill Road, its major access point. Facilities include a nature preserve, a pond, a tot lot, and a tennis court.

#### Dulles Airport

The Dulles Airport section starts near the Loudoun County line and encompasses the Dulles Airport property. No residential properties are located within this section.

#### Loudoun County

This westernmost section goes from the Dulles Greenway at Route 606 through Route 772. Three neighborhoods are located in this otherwise sparsely populated section; all are north of the Dulles Greenway/Route 772 interchange, as shown in Figure 3.2-1f.

**The Regency.** This subdivision, located between Waxpool, Shellhorn, and Ryan Roads, is a recently constructed complex of large single-family homes on drives and cul-de-sacs. Access to the neighborhood is from Waxpool Road. No community facilities are located in the neighborhood.

**Comstock Crossing.** This subdivision is still under construction and not yet fully occupied. When complete, Comstock Crossing would be a dense townhouse development. The complex is located on Waxpool Road near the intersection with Shellhorn Road. No community facilities are located in the subdivision.

**Groves at Flynn's Crossing.** Located south of Comstock Crossing at Blossom Road Terrace in Ashburn, this neighborhood is a garden apartment complex with access via Ryan Road. Amenities include a swimming pool, fitness center, clubhouse, and playground.

### 3.2.2.2 Community Facilities and Services

Community facilities include hospitals, parks, places of worship, day care centers, schools, government offices such as post offices, police, and fire stations, cultural centers, and special service providers. These facilities provide services to the residents and visitors of the corridor. Community facilities also contribute to

community cohesion of the neighborhoods in which they are located, and are valuable amenities to the residents in the study area, as defined in Section 3.2.1.

Existing community facilities are located in the Orange Line Connection, Tysons Corner, and the Mid-Corridor segments. These community facilities are shown in Figure 3.2-1, and listed in Table 3.2-1.

**Table 3.2-1: Community Facilities and Services in Study Area**

| Community Facility or Service | Location |
|---|---|
| **Orange Line Connection Section** | |
| George Mason Jr./Sr. High School | 7124 Leesburg Pike (at Haycock Road), Falls Church |
| Mount Royal Park | 7141 Idylwood Road (at Idylwood Court), McLean |
| Lemon Road Elementary School | 7230 Idylwood Road, McLean |
| Church of Latter Day Saints | Greenwich Street at Kirby Road, McLean |
| Pimmit Run Stream Valley Park | Old Dominion Road and Leesburg Pike, McLean |
| Tuckahoe Recreation Club | 1814 Great Falls Street, McLean |
| Olney Park | 1840 Olney Road, McLean |
| Our Small World Children's Center | 1700 Great Falls Street, McLean |
| Pimmit View Park | 1905 Storm Drive, McLean |
| Westgate Elementary School | 7500 Magarity Road, Falls Church |
| Westgate Park | 7508 Magarity Road, Falls Church |
| Scotts Run Stream Valley Park | Meadow Road and Tremayne Place, McLean |
| **Tysons Corner Section** | |
| Capital Church* | 7903 Westpark Drive, McLean |
| Apostle Church* | 7903 Westpark Drive, McLean |
| McLean Hamlet Park | 8119 Dunsinane Court (north of Dulles Toll Road), McLean |
| Spring Hill Elementary School | 8201 Lewinsville Road, McLean |
| Tysons-West*Park Transit Station | 8300 Jones Branch Drive, McLean |
| Shiloh Baptist Church | 1331 Spring Hill Road (Lewinsville Road east of International Drive), McLean |
| Charity Baptist Church | 1328 Spring Hill Road (International Drive and Lewinsville Road), McLean |
| U.S. Postal Office | 1544 Spring Hill Road south of Tyco Road, McLean |
| Fire Company #29 | 1560 Spring Hill Road, McLean |
| Raglan Road Park | 8590 Raglan Road, Tysons Corner |
| Westbriar Elementary School | 1741 Pine Valley Drive, Tysons Corner |
| Old Courthouse Spring Branch Stream Valley Environmental Quality Corridor | West of Tysons Corner |
| Berea Church of Christ | 8817 Leesburg Pike, McLean |
| Ash Grove Historic Site | Leesburg Pike and Dulles Toll Road, Vienna |
| **Mid-Corridor Section** | |
| Barns of Wolf Trap | 1624 Trap Road (south of Dulles Toll Road), Vienna |
| Wolf Trap Farm Park for the Performing Arts | 1551 Trap Road (north of Dulles Toll Road), Vienna |
| Meadowlark Gardens Regional Park | 9750 Meadowlark Gardens Court, Vienna |
| Jehovah's Witnesses Congregation of Vienna | Beulah Road and Dulles Toll Road, Vienna |
| Wolf Trap Stream Valley Park | Coral Bells Court west of Beulah Road, Vienna |
| Sun Valley Park | Between Abbey Oak Drive and Dulles Toll Road, Vienna |
| Tamarack Park | Abbey Oak Drive and Nevar Court, Vienna |
| Difficult Run Stream Valley Park | Meadowlark Road south of Dulles Toll Road, Vienna |
| Cartersville Baptist Church | Hunter Mill Road north of Sunrise Valley Drive, Reston |
| Reston Presbyterian Church | 10610 Sunset Hills Boulevard (Hunter Mill Road north of Dulles Toll Road), Reston |

| Community Facility or Service | Location |
|---|---|
| W&OD Railroad Regional Park | Throughout Mid-Corridor |
| Lake Thoreau | South of Sunrise Valley Drive, Reston |
| Lake Thoreau Pool | Sunrise Valley Drive and Upper Lake, Reston |
| Boston Ridge Playfield | Sunrise Valley Drive and Headlands Circle, Reston |
| Upper Lake Tennis Courts | Sunrise Valley Drive and Upper Lake, Reston |
| Fire Company #25 | 1820 Wiehle Avenue, Reston |
| Reston East Park-and-Ride | North of Dulles Toll Road and Wiehle Avenue, Reston |
| VDOT Park-and-Ride | Sunset Hills Road and Wiehle Avenue, Reston |
| Hidden Creek Country Club Golf Course | 1711 Clubhouse Road, Reston |
| Good Beginnings School | 11501 Sunrise Valley Drive, Reston |
| Reston National Golf Course | South of Sunrise Valley Drive, Reston |
| Newbridge Recreation Area | Newbridge Court south of Sunrise Valley Drive, Reston |
| YMCA | 12196 Sunset Hills Road, Reston |
| Haley Smith Park | Van Buren and Herndon Parkway, Herndon |
| Montessori Country School | 612 Alabama Drive, Reston |
| Herndon - Monroe Park-and-Ride | Fairfax County Parkway and Monroe Street, Reston |
| Sunrise Valley Park Wildlife Habitat and Nature Preserve | Sunrise Valley Drive and Monroe Avenue, Reston |
| Reston Montessori School | 1928 Isaac Newton Square |
| Sunset International Montessori School I | 1980 Isaac Newton Square |
| Mulberry Childcare and Preschool | 1946 Isaac Newton Square |
| Chandon Park | 900 Palmer Drive, Herndon |
| Hutchison Elementary School | 13209 Parcher Avenue, Herndon |
| Soccer Fields | Farougi Court north of the Dulles Toll Road, Herndon |
| Center for Innovative Technology | 2214 Rock Hill Road, Herndon |
| **Loudoun County** | |
| National Capital Area Council Boy Scouts of America Campground | Route 772 and Dulles Greenway, Loudoun |

Sources: Fairfax County Department of Systems Management for Human Services, Research, Analysis, and Project Services.
* Both Apostle Mission and Capital Churches are temporarily renting the facility located at 7903 West Drive from West Group Properties, LLC.

## 3.2.3 LONG-TERM EFFECTS

This section describes the long-term effects of the Baseline and the four Build Alternatives on communities within the Dulles Corridor.

### 3.2.3.1 Baseline Alternative

This section presents known changes in neighborhoods and community facilities that would occur within the study area under the Baseline Alternative. The Baseline Alternative includes all planned actions in the study area, except those proposed by the Build Alternatives. Some of the transportation projects or development activities included in the Baseline Alternative might have impacts on neighborhoods, communities, and community facilities within the study area that are independent of the Dulles Corridor Rapid Transit Project. These impacts could include changes in population, community cohesion, increases in noise levels, or other physical intrusions into communities that would be the responsibility of those agencies or jurisdictions implementing the individual projects included in the Baseline Alternative. The effects of these changes, in addition to the proposed Build Alternatives are addressed in the assessment of cumulative effects in Chapter 9 of this Draft EIS.

Access to neighborhoods and community facilities might also change based on the implementation of transportation projects within the Baseline Alternative. Although the Baseline Alternative includes large increases in express bus service, it does not include any additional transit improvements within the study area, therefore, there is a lost mobility benefit associated with this alternative. The improved access to neighborhoods and community facilities associated with the Build Alternatives would not be provided, even though the population and employment of the corridor would continue to grow under the Baseline Alternative. A summary of potential impacts from the Baseline Alternative is shown in Table 3.2-2.

**Table 3.2-2: Community Impacts of Baseline Alternative**

| Type of Community Impact | Effect of Alternative |
|---|---|
| Changes in Population and Employment | No effect – changes associated with projects are already incorporated into projections |
| Community Cohesion and Interaction | Potential for some impact to cohesion associated only with other projects, none have been identified specifically for neighborhoods in this study area |
| Isolation Effects | Potential for some impact to cohesion associated only with other projects, none have been identified specifically for neighborhoods in this study area |
| Social Values – Social Groups Benefited or Harmed | No effect identified on communities in study area |
| Barrier Effects | No effect identified on communities in study area |
| Noise and Vibration | Some noise increases could be associated with other projects in Baseline Alternative |
| Physical Intrusions – Dust, Odor, Light | No effect identified on communities in study area |
| Access Changes – Bicycle, Pedestrian, Transit, and Vehicular | Access to corridor neighborhoods and community facilities limited due to lack of a Build Alternative |
| Community Facility Impacts | No effect identified on any community facilities or services in study area |
| Displacements | Some displacements could be associated with other projects in Baseline Alternative |
| Safety – Pedestrian and Bicyclists, Crime, and Emergency Response | No effect identified on communities in study area.<br>Traffic projected to increase in neighborhoods |
| Property Values | No effect identified on communities in study area |

### 3.2.3.2 BRT Alternative

Neighborhood and community effects and community facility effects under the three BRT Alignments (BRT 1, BRT 2, and BRT 3) are shown in Table 3.2-3. In general, the interaction between the BRT Alternatives and communities within the corridor would be limited owing to the location of the BRT Alignments within the median of existing transportation corridors.

**Table 3.2-3: Community Impacts of BRT Alternative**

| Type of Community Impact | BRT 1 | BRT 2 | BRT 3 |
|---|---|---|---|
| Changes in Population and Employment | Potential increase at Mid-Corridor and Loudoun stations and stops | Potential increase at Mid-Corridor and Loudoun stations and stops | Potential increase at Mid-Corridor and Loudoun stations and stops |
| Community Cohesion and Interaction | No effect | No effect | No effect |
| Isolation Effects | No effect | No effect | No effect |

| Type of Community Impact | BRT 1 | BRT 2 | BRT 3 |
|---|---|---|---|
| Social Values – Social Groups Benefited or Harmed | Mobility benefit to communities near stations | Mobility benefit to communities near stations | Mobility benefit to communities near stations |
| Barrier Effects | No effect | No effect | No effect |
| Noise and Vibration | Six neighborhoods | Six neighborhoods | Six neighborhoods |
| Physical Intrusions – Dust, Odor, Light | Construction effect at two neighborhoods | Construction effect at one neighborhood | Construction effect at one neighborhood |
| Access Changes – Bicycle, Pedestrian, Transit, and Vehicular | Mobility benefit<br>Increase in traffic volumes at stations, congestion would affect two neighborhoods in Tysons Corner at Spring Hill Road Station, neighborhoods on Sunrise Valley Drive in Reston and two neighborhoods on Centreville Road.<br>Potential parking spillover at Wiehle Avenue and Herndon-Monroe stations | Mobility benefit<br>Increase in traffic volumes at stations, congestion would affect two neighborhoods in Tysons Corner at Tysons-West*Park Transit Station and neighborhoods on Sunrise Valley Drive in Reston<br>Potential parking spillover at Wiehle Avenue and Herndon-Monroe stations | Mobility benefit<br>Increase in traffic volumes at stations, congestion would affect two neighborhoods in Tysons Corner at Tysons-West*Park Transit Station and neighborhoods on Sunrise Valley Drive in Reston<br>Potential parking spillover at Wiehle Avenue and Herndon-Monroe stations |
| Community Facility Impacts | Traffic congestion at Fire Company #25 on Wiehle Avenue and park-and-ride facilities<br>Soccer field at Route 28 converted due to private developer proffer | Traffic congestion at Fire Company #25 on Wiehle Avenue and park-and-ride facilities | Traffic congestion at Fire Company #25 on Wiehle Avenue and park-and-ride facilities |
| Residential Acquisitions | No effect | No effect | No effect |
| Residential Displacements | No effect | No effect | No effect |
| Safety – Pedestrian and Bicyclists, Crime, and Emergency Response | Increase in vehicular traffic volumes on local roads adjacent to stations | Increase in vehicular traffic volumes on local roads adjacent to stations | Increase in vehicular traffic volumes on local roads adjacent to stations |
| Property Values | Increase at station areas | Increase at station areas | Increase at station areas |

## Alignment BRT 1

**Orange Line Connection**. Because Alignment BRT 1 would be located within the median of the Dulles Connector Road from West Falls Church to Tysons Corner, it would have limited interaction with communities. The BRT Alternative would be located within 300 feet of seven neighborhoods. Two of the neighborhoods, the Pavilion and Westhampton, are also within one half-mile of the West Falls Church Metrorail Station, where bus layover facilities and driver amenities would be constructed.

The only potential community impacts within this section are noise impacts associated with the bus operations in the corridor and potential construction effects associated with the facilities at the West Falls Church Station. The neighborhoods that would be affected by noise are Westhampton and Pimmit Hills. The construction of the facilities at West Falls Church Station would create the potential for noise and construction effects close to the Pavilion, which overlooks the station. No community facilities would be affected.

**Tysons Corner.** Alignment BRT 1 would be located within 300 feet of the McLean Hamlet neighborhood. Six of the neighborhoods in Tysons Corner are within one half-mile of the Spring Hill Road Station. These neighborhoods would experience mobility benefits associated with increased transportation opportunities. Two neighborhoods would experience noise impacts: McLean Ridge and McLean Hamlet. Although there would be construction effects associated with construction of a median station, the neighborhoods are removed from the Dulles Toll Road and would not experience effects. An increase in traffic volumes would result in congestion during the peak periods on roads that provide access to the Spring Hill Road Station. The proposed Spring Hill Road Station would have primary access from International Drive and Jones Branch Drive. The Rotonda and The Lincoln at Tysons apartment complexes would experience an increase in traffic because their primary access points are located on International Drive and Jones Branch Drive. Increases of vehicular and pedestrian traffic at the BRT station are projected. No community facilities would be affected.

**Mid-Corridor.** Alignment BRT 1 would be located within 300 feet of 11 neighborhoods in the Mid-Corridor section of the project. All of these neighborhoods are located between Route 7 at Tysons Corner and Hunter Mill Road. In most instances, only small portions of the neighborhoods are within 300 feet and, for most of this section, noise barriers are in place that screen the neighborhoods from noise and visual impacts.

Seven neighborhoods are within one half-mile of the Wiehle Avenue Station, all located to the south of the DAAR and Dulles Toll Road and accessed from Sunrise Valley Drive. Three neighborhoods are within one half-mile of the proposed Reston Parkway Station, and five neighborhoods are within one half-mile of the proposed Herndon-Monroe Station. At the proposed Route 28 Station, four neighborhoods are within the one half-mile radius, along with the proposed Dulles Station neighborhood.

Within the Mid-Corridor section, community impacts would be limited due to the geographic separation of neighborhoods along the Dulles Toll Road in Reston. New mixed-use neighborhoods could be constructed in the transit station areas, according to the *Fairfax County Comprehensive Plan,* that would add population and employment in the area. This potential increase in population and employment would increase traffic volumes and the use of community facilities as well as change the character of development at the BRT stations. Property values are projected to increase as transit is provided in the corridor, particularly for neighborhoods within walking distance of the proposed BRT stations.

Construction of BRT 1 provides mobility benefits to neighborhoods located within proximity to the stations. Chathams Ford and Reflection Woods, two neighborhoods in the Mid-Corridor section, would experience noise impacts due to their proximity to the BRT Alternative. There would be construction effects (increase in dust, noise, light, and truck traffic) associated with the four median stations. Only the Route 28 Station would be close enough to neighborhoods to affect them during construction. The increase in traffic during construction of stations would affect turning movements into the neighborhoods located on Sunrise Valley Drive at the Wiehle Avenue Station and the Herndon-Monroe Station. This increase in vehicular traffic would influence pedestrian safety at each station location, and pedestrian facilities would be designed to mitigate any conflicts.

BRT 1 would affect two community facilities. Fairfax County Fire Company #25 would experience traffic congestion at its location on Wiehle Avenue, although it does have a pre-emptive traffic signal to control the flow of traffic. The soccer field north of the Route 28 Station would be converted to transit facilities by a private developer as part of a proffer with Fairfax County. No other community facilities would be affected.

**Dulles Airport.** The BRT Maintenance and Storage Facility would be located on MWAA property. There would be no impacts to communities or community facilities at this location, other than improved mobility to Dulles Airport provided for passengers and employees.

**Loudoun County.** There would be no impacts to communities or community facilities in Loudoun County, other than increased mobility and transportation options for the neighborhoods at the Route 772 Station, and increased transportation access to future developments.

#### Alignment BRT 2

Neighborhood impacts and benefits resulting from BRT 2 would be the same as those under BRT 1, with a few exceptions. The removal of the Route 28 Station would eliminate any construction effects that could affect the Reflection Woods neighborhood and would reduce the potential overall increase in population, employment, and traffic within the local area. In addition, it would eliminate the need for transit facilities that would be located on the soccer fields north of the station. However, the elimination of these facilities and the station would increase the demand for parking at the Herndon-Monroe and Wiehle Avenue stations, beyond the planned capacity. This could increase the potential for parking spillover within neighborhoods located within the half-mile radius of the station platforms. These neighborhoods are located along Sunrise Valley Drive south of the Dulles Toll Road.

#### Alignment BRT 3

Neighborhood impacts and benefits resulting from BRT 3 would be the same as those described for BRT 2. The elimination of the Wiehle Avenue and Herndon-Monroe stations would remove most potential for construction effects in these areas and would likely remove any density bonuses that could lead to increases in population and employment at these station areas. All other community impacts would be similar to Alignment BRT 2.

### 3.2.3.3 Metrorail Alternative

Table 3.2-4 lists the community impacts associated with the various Metrorail alignment alternatives.

**Table 3.2-4: Community Impacts of Metrorail Alternative**

| Type of Community Impact | T1 | T6 | T9 | T4 |
|---|---|---|---|---|
| Changes in Population and Employment | Potential increase at stations | Potential increase at stations | Potential increase at stations | Potential increase at stations |
| Community Cohesion and Interaction | No effect | No effect | No effect | No effect |
| Isolation Effects | No effect | No effect | No effect | One neighborhood |
| Social Values – Social Groups Benefited or Harmed | Mobility benefit to communities near stations | Mobility benefit to communities near stations | Mobility benefit to communities near stations | No effect |
| Barrier Effects | Limited to portal locations | Limited to portal locations | Limited to portal locations | No effect |
| Noise and Vibration | 12 neighborhoods | 12 neighborhoods | 12 neighborhoods | 15 neighborhoods |
| Physical Intrusions – Dust, Odor, Light | Construction Effects – 3 neighborhoods<br>Long Term Effects – 2 neighborhoods | Construction Effects – 3 neighborhoods<br>Long Term Effects – 2 neighborhoods | Construction Effects – 3 neighborhoods<br>Long Term Effects – 2 neighborhoods | Construction Effects – 6 Neighborhoods<br>Long Term Effects – 5 neighborhoods |

| Type of Community Impact | T1 | T6 | T9 | T4 |
|---|---|---|---|---|
| Access Changes – Bicycle, Pedestrian, Transit, and Vehicular | Mobility benefit<br>Increase in traffic volumes at stations, congestion affects two neighborhoods in Tysons West Station area, neighborhoods on Sunrise Valley Drive in Reston, and two neighborhoods on Centreville Road.<br>Potential parking spillover at Tysons East, Tysons West, Wiehle Avenue and Herndon-Monroe | Mobility benefit<br>Increase in traffic volumes at stations, congestion affects two neighborhoods in Tysons West Station area and neighborhoods on Sunrise Valley Drive in Reston<br>Potential parking spillover at Tysons East, Wiehle Avenue and Herndon-Monroe | Mobility benefit<br>Increase in traffic volumes at stations, congestion affects two neighborhoods in Tysons West Station area and neighborhoods on Sunrise Valley Drive in Reston<br>Potential parking spillover at Tysons East, Wiehle Avenue and Herndon-Monroe | Mobility benefit<br>Increase in traffic volumes at stations, congestion affects two neighborhoods in Tysons West Station area and neighborhoods on Sunrise Valley Drive in Reston<br>Potential parking spillover at Tysons East, Wiehle Avenue and Herndon-Monroe |
| Community Facility Impacts | Traffic congestion at Fire Company #25 on Wiehle Avenue and park-and-ride facilities<br>Soccer field at Route 28 converted due to private developer proffer | Traffic congestion at Fire Company #25 on Wiehle Avenue and park-and-ride facilities<br>Soccer field at Route 28 converted due to private developer proffer | Traffic congestion at Fire Company #25 on Wiehle Avenue and park-and-ride facilities<br>Soccer field at Route 28 converted due to private developer proffer | Potential impact on temporary churches on Westpark Drive<br>Traffic congestion at Fire Company #25 on Wiehle Avenue and park-and-ride facilities<br>Soccer field at Route 28 converted due to private developer proffer |
| Residential Acquisitions | Nine partial | Nine partial | Nine partial | Nine partial |
| Residential Displacements | No effect | No effect | No effect | No effect |
| Safety – Pedestrian and Bicyclists, Crime, and Emergency Response | Increase in vehicular traffic volumes on local roads adjacent to stations | Increase in vehicular traffic volumes on local roads adjacent to stations | Increase in vehicular traffic volumes on local roads adjacent to stations | Increase in vehicular traffic volumes on local roads adjacent to stations |
| Property Values | Increase at station areas | Increase at station areas | Increase at station areas | Increase at station areas |

### Orange Line Connection

The Metrorail Alternative is located within the median of the Dulles Connector Road from West Falls Church through Tysons Corner and is located within 300 feet of seven neighborhoods.

The only potential community impacts within this section are noise impacts. The neighborhoods that would be affected by noise are Westhampton, Idylwood, and Pimmit Hills. Construction effects would not be visible to neighborhoods in this section.

The Metrorail Alternative in this section would not affect community facilities. Although Mount Royal Park is located adjacent to the site of the proposed West Falls Church S&I Yard, no impacts would result from the addition of storage tracks within the center of this yard (see Section 3.6). No neighborhood or community impacts would result from the proposed traction power substations, tie-breaker stations, or stormwater management ponds.

### Tysons Corner

**Alignment T1.** Alignment T1 would include construction of Metrorail along Route 123 and Route 7 and three aerial stations. Two neighborhoods are within 300 feet of Alignment T1, Hunting Ridge and Westwood Village. The Tysons East Station would be located within one half-mile of seven neighborhoods. Two neighborhoods would be within one half-mile of the Tysons Central Station. Six neighborhoods would be within one half-mile of the Tysons West Station. They would all experience mobility improvements due to the new transit service provided.

Redevelopment and in-fill development could be constructed in the transit station areas, according to the *Fairfax County Comprehensive Plan*, which would add population and employment in the area. The potential increases in population and employment could increase traffic volumes and the use of community facilities as well as change the character of development at the transit stations. Property values are projected to increase as transit is provided in the corridor, particularly for those properties within walking distance of the Metrorail stations.

Under Alignment T1, proximity noise impacts could occur at several neighborhoods that would be or are located close to the alignment. The neighborhoods affected would be McLean Ridge, Hunting Ridge, Westwood Village, Hallcrest Heights, and The Commons. There would be construction effects (increase in dust, noise, light, and truck traffic) associated with construction of the aerial and underground segments of the alignment and stations. The Hunting Ridge/McLean Ridge townhouse community and Westwood Village would experience physical intrusions such as light and noise increases during the construction phase, and would also experience a long-term change in appearance because the aerial structures and stations at Tysons East and West would be visible to residents. Traffic congestion related to Alignment T1 associated with the Tysons West Station would minimally affect the Rotonda and Avalon Crescent neighborhoods. This increase in vehicular traffic could affect pedestrian safety at each station location, and pedestrian facilities would be designed to mitigate any conflicts. At Tysons East, Kiss & Ride parking demand would exceed the supply and could result in some spillover to neighborhoods. In addition, the abandonment of the access driveway to the storage site located behind the proposed Tysons West Station would have a minimum effect on the surrounding neighborhoods as new access to this site would be provided via the Tyco Road Station entrance.

Alignment T1 would not create a physical barrier within Tysons Corner in relation to the neighborhoods because it would use major roadways, and most of the alignment would be either aerial or underground. The only potential effect is associated with the portal segments, although access to surrounding land uses would be provided. No community facilities would be affected.

All of the neighborhoods in Tysons Corner would experience increases in traffic congestion, population, and employment as a result of future development. The analysis presents a "worst-case" assessment, however, the overall traffic impact in Tysons Corner is localized to specific streets in the vicinity of the station areas.

With regard to the increased densities planned in Tysons Corner, the Comprehensive Plan for Tysons Corner would limit the amount of development that could occur if mode split and traffic mobility/capacity goals are not met.

**Alignments T6 and T9.** The neighborhood impacts of Alignments T6, T9, and T9 Design Option would be similar to those of Alignment T1, with the addition of impacts related to the Tysons Central C

Station. This station would be within one-half mile of 12 neighborhoods located along Gosnell Road and Westpark Drive.

Alignments T6, T9, and T9 Design Option would not create a new physical barrier for any of the neighborhoods due to their use of major roadways and their mostly aerial or underground locations. There would be proximity noise impacts within several neighborhoods under Alignment T6. The neighborhoods affected would be McLean Ridge, Hunting Ridge, Hallcrest Heights and The Commons. Westwood Village would not experience noise impacts under T9 or T9 Design Option.

**Alignment T4.** Five neighborhoods would be within 300 feet of Alignment T4 in Tysons Corner. All of the Tysons Corner neighborhoods would be within one half-mile of at least one of the six proposed transit stations. Seven neighborhoods would be within one half-mile of Tysons East, four within one half-mile of Tysons Central A, four more within one half-mile of Tysons Central B, twelve within one half-mile of Tysons Central C, two within one half-mile of Tysons Central D, and six within one half-mile of Tysons West. All of these neighborhoods would experience improvements in mobility.

Redevelopment and in-fill development could occur within the transit station areas, according to the *Fairfax County Comprehensive Plan*. This potential increase in population and employment would increase traffic volumes and the use of community facilities, as well as change the character of development at the transit stations. Property values are projected to increase as transit is provided in the corridor, particularly for properties within walking distance of the Metrorail stations.

Avalon Crescent, the Rotonda, and The Lincoln at Tysons are all located adjacent to the proposed Metrorail alignment along Westpark Drive and the Tysons Central B Station. Traffic, noise, air quality, and visual impacts are assessed in separate sections of this document, but the presence of the actual structure and facilities would affect each of these three neighborhoods, particularly the Rotonda and Avalon Crescent, which would have units directly next to the aerial alignment. The presence of the aerial structure and station, where none currently exists, and in such proximity to the Rotonda, could create a perceived isolation effect. Proximity noise impacts would occur within several neighborhoods under Alignment T4. The neighborhoods would be the Rotonda, McLean Ridge, Hunting Ridge, The Commons, Westwood Village, and Hallcrest Heights.

Construction effects (increases in dust, noise, light, and truck traffic) would be associated with construction of the aerial alignment and stations. The Avalon Crescent, the Rotonda, The Lincoln at Tysons, Hunting Ridge/McLean Ridge townhouse community, and Westwood Village would experience physical intrusions such as light and noise increases during the construction phase, and would also experience a long-term change in appearance because the aerial structures and stations at Tysons Central B, Tysons East, and Tysons West would be visible to residents. Traffic congestion associated with the Alignment T4 and the Tysons West Station would minimally affect the Rotonda and Avalon Crescent neighborhoods. This increase in vehicular traffic could influence pedestrian safety at each station location. Pedestrian facilities would be designed to mitigate any conflicts. At Tysons East Station, parking demand could exceed supply and could result in some spillover to neighborhoods. In addition, the abandonment of the access driveway to the storage site located behind the proposed Tysons West Station would have a minimum effect on the surrounding neighborhoods as new access to this site would be provided via the Tyco Road Station entrance.

No community facilities would be affected by any of the alignments in this section of the study area. A temporary church use of office space on Westpark Drive would be affected by loss of some parking. No

neighborhood or community impacts would result from the proposed traction power substations, tie-breaker stations, or stormwater management ponds.

### Mid-Corridor

Impacts in the Mid-Corridor section, under the Metrorail Alternative, would be similar to those discussed for Alignment BRT 1 in this section. Impacts to neighborhoods would occur only from the station facilities located north and south of the DAAR and Dulles Toll Road and associated traffic increases. However, more neighborhoods would experience proximity noise impacts under the Metrorail Alternative. Impacts could occur within the neighborhoods of Chathams Ford, Reflection Woods, Carters Grove, Sun Valley, and Windstone. The other difference associated with the Metrorail alternative is that higher levels of growth would be allowed at each of the transit stations, increasing demand on community facilities and resulting in greater traffic volumes at the transit stations.

The partial acquisition of eight residential properties would be required for the placement of stormwater management ponds (7) and a traction power substation. Neighborhoods near Metrorail stations would benefit from increased transportation options (1).

### Dulles Airport

No neighborhoods or community facilities are located within the Dulles Airport section; no impacts would occur.

### Loudoun County

The Metrorail Alternative within this section would consist of rail in the median of the Dulles Greenway, stations at Route 606 and Route 772, and an S&I Yard in the vicinity of the Route 606 Station. Three neighborhoods are located within one half-mile of the proposed site of the Route 772 Station.

The Metrorail Alternative would not create new physical barriers to neighborhoods in Loudoun County in the study area, most of which is currently undeveloped. No proximity impacts are anticipated to the three neighborhoods located within one-half mile of the proposed Route 772 Station.

The Metrorail Alternative would not result in additional roads or access points within any of the neighborhoods in this section. The access point for the Route 772 Station would be from county-planned roads that are yet to be constructed. This site would have indirect access only from roads providing access to the three neighborhoods within one half-mile of the station, and then only if the northern site is selected. No cut-through traffic impacts would occur. No neighborhood or community impacts would result from the proposed traction power substations, the tie-breaker stations, or stormwater management ponds. Neighborhoods in proximity to Metrorail stations would benefit from increased transportation options.

### S&I Yard

The Metrorail S&I Yard Site 7 would be in an area that is currently undeveloped; it would not have any effect on community facilities or neighborhoods.

There are no anticipated impacts on community facilities for Sites 15 and 20. Noise impacts are possible at a residential development north of Site 20 named Westwind Crossing. The development includes existing rental apartments and owner-occupied townhouses. An office building, hotel, gas station, and commercial buildings are planned for development. Site 15 is not anticipated to present a noise impact to the surrounding area.

#### 3.2.3.4 BRT/Metrorail Alternative

The BRT/Metrorail Alternative would include the construction of Metrorail facilities in the eastern portion of the corridor, through Tysons Corner. West of Tysons Corner, the BRT/Metrorail Alternative would be identical to the BRT Alternative. The community impacts resulting from the BRT/Metrorail Alternative would be a combination of those described in the previous sections.

From the Orange Line Connection through Tysons Corner, the effects on neighborhoods and community facilities resulting from the BRT/Metrorail Alternative would be the same as those discussed for the Metrorail Alternative except that Westwood Village, in comparison to the Metrorail Alternative, would not experience a proximity impact due to noise. From the Mid-Corridor through to the end of the study area in Loudoun County, the impacts to neighborhoods and community facilities would be the same as those of the BRT Alternative. However, at Wiehle Avenue there would be no spillover demand for parking that could affect neighborhoods.

The impacts to neighborhoods and community facilities would be the same as those described for Site 14 under the BRT 1 discussion.

#### 3.2.3.5 Phased Implementation Alternative

The effects of the Phased Implementation Alternative would be the same as those identified above for the Metrorail Alternative. No additional effects over those identified for the Metrorail Alternative would result from first implementing BRT or from removal of BRT facilities after Metrorail is operational.

### 3.2.4 CONSTRUCTION EFFECTS

The following sections detail the short-term construction effects that would result from the alternatives under consideration.

#### 3.2.4.1 Baseline Alternative

Under the Baseline Alternative, there would be no effects from the Dulles Corridor Rapid Transit Project. However, construction-related impacts to neighborhoods and community facilities could result from the improvements assumed as part of this alternative. Identification of these effects would be the responsibility of the agencies and jurisdictions implementing the improvements.

#### 3.2.4.2 BRT Alternative

During construction of the BRT Alternative, construction-related traffic, noise, air, and visual impacts would occur. The only two locations where construction would affect neighborhoods would be at the Pavilion neighborhood, which will overlook construction at West Falls Church for all BRT alignments, and the Reflection Woods neighborhood, from which construction cranes will be visible during the construction of the Route 28 Station (BRT 1 Alignment only).

#### 3.2.4.3 Metrorail Alternative

During construction of the Metrorail Alternative, construction-related traffic, noise, air quality, and visual impacts would occur. These impacts are addressed in the individual sections for each of these topics. Generally, these short-term impacts would not affect most of the neighborhoods because they are not located immediately adjacent to the proposed alignment or stations where major construction would occur, or they are already buffered from the transportation corridor. The potential impacts at the Route 28 Station for the Reflection

Woods and Dulles Greens neighborhoods would be the same as those described for the BRT Alternative. Three neighborhoods, Hunting Ridge, McLean Ridge, and Westwood Village would experience physical intrusions, primarily visual effects, during the construction of all alignments. Under the T4 Alignment, in addition to the previous three neighborhoods, construction would affect Avalon Crescent, The Rotonda, and The Lincoln at Tysons as the aerial alignment is being built. The construction effects for the rest of the corridor are the same as those described under the BRT Alternative, where the construction of the median stations would be visible to the Pavilion and Reflection Woods neighborhood.

There would be no impacts to neighborhoods resulting from the construction of a tunnel in Tysons Corner or at Dulles Airport.

#### 3.2.4.4 BRT/Metrorail Alternative

Construction effects would be the same as described for the BRT and Metrorail alternatives. The impacts resulting from the construction of a tunnel in Tysons Corner and at Dulles Airport would be the same as for the Metrorail Alternative.

#### 3.2.4.5 Phased Implementation Alternative

Construction of this alternative would involve the implementation of BRT and Metrorail over an extended period of time. Although the construction effects would be the same as those identified above for the other three alternatives, the timing would be different. The effects of constructing Metrorail through Tysons Corner would compound the effects of constructing BRT between the Orange Line and Loudoun County. These effects would then be followed by the effects of constructing Metrorail from Tysons Corner to the end of the study area in Loudoun County.

### 3.2.5 MITIGATION

Available mitigation strategies for community impacts would focus on reducing noise, visual, and construction effects. Strategies to mitigate the potential for traffic effects and parking are discussed in Section 6.2. Other mitigation strategies that could be incorporated into the design for the Locally Preferred Alternative include: truck access and circulation planning; lighting control plans; design features at transit station areas that would be compatible with existing communities; and comprehensive landscaping and buffering throughout the corridor.

### 3.2.6 SUMMARY OF EFFECTS

A summary of the effects to neighborhoods and community facilities discussed above is presented in Table 3.2-5.

**Table 3.2-5: Summary of Neighborhood and Community Facilities Effects**

| Alternative | Isolation Effects | Noise and Vibration | Physical Intrusions, Dust, Odor, Light | General | Mitigation |
|---|---|---|---|---|---|
| Baseline | None | None | None | None | None |
| BRT 1 | No effect | Six neighborhoods | Construction at median stations | Mobility benefit, increase in traffic volumes at stations. | Truck access and circulation planning, lighting, control plans, landscape buffering. |

| Alternative | Isolation Effects | Noise and Vibration | Physical Intrusions, Dust, Odor, Light | General | Mitigation |
|---|---|---|---|---|---|
| BRT 2 | No effect | Six neighborhoods | Construction at median stations | Mobility benefit, increase in traffic volumes at stations, parking spillover at Wiehle Avenue and Herndon-Monroe stations | Truck access and circulation planning, lighting, control plans, landscape buffering. |
| BRT 3 | No effect | Six neighborhoods | Construction at Reston Parkway median station | Mobility benefit, increase in traffic volumes at stations, parking spillover at Wiehle Avenue and Herndon-Monroe stations | Truck access and circulation planning, lighting, control plans, landscape buffering. |
| Metrorail T1 | No effect | 12 neighborhoods | Construction – three neighborhoods.<br>Long term – two neighborhoods. | Mobility benefit, increase in traffic volumes at stations, parking spillover at Tysons East, Wiehle Avenue, and Herndon-Monroe stations | Truck access and circulation planning, lighting, control plans, landscape buffering. |
| Metrorail T6 | No effect | 12 neighborhoods | Construction – three neighborhoods. Long term – two neighborhoods. | Mobility benefit, increase in traffic volumes at stations, parking spillover at Tysons East, Wiehle Avenue, and Herndon-Monroe stations | Truck access and circulation planning, lighting, control plans, landscape buffering. |
| Metrorail T9 | No effect | 12 neighborhoods | Construction – three neighborhoods.<br>Long term – two neighborhoods | Mobility benefit, increase in traffic volumes at stations, parking spillover at Tysons East, Wiehle Avenue, and Herndon-Monroe stations | Truck access and circulation planning, lighting, control plans, landscape buffering. |
| Metrorail T4 | One neighborhood | 15 neighborhoods | Construction – six neighborhoods.<br>Long term – Five neighborhoods. | Mobility benefit, increase in traffic volumes at stations, parking spillover at Tysons East, Wiehle Avenue, and Herndon-Monroe stations | Truck access and circulation planning, lighting, control plans, landscape buffering. |
| BRT/Metrorail | 0-1 neighborhood | 12-15 neighborhoods | Construction – three to six neighborhoods.<br>Long term – two to five neighborhoods. | Mobility benefit, increase in traffic volumes at stations, parking spillover at Tysons East, Wiehle Avenue, and Herndon-Monroe stations | Truck access and circulation planning, lighting, control plans, landscape buffering. |
| Phased Implementation | 0-1 neighborhood | 6-15 neighborhoods | Construction –three to six neighborhoods.<br>Long term – two to five neighborhoods. | Mobility benefit, increase in traffic volumes at stations, parking spillover at Tysons East, Wiehle Avenue, and Herndon-Monroe stations | Truck access and circulation planning, lighting, control plans, landscape buffering. |

## 3.3 DISPLACEMENT AND RELOCATION

This section discusses property displacements, relocations, or acquisitions (partial or full) that might occur due to the Dulles Corridor Rapid Transit Project. Displacements result from right-of-way acquisitions that require the use of existing land uses. Federal and state laws require that property owners be paid fair market value for their land and buildings, and that they be assisted in finding replacement business sites or dwellings. Partial acquisitions occur when only a portion of an existing land use is required and as such may not result in a displacement or relocation. Full acquisitions occur when a complete parcel is required and result in either a displacement or relocation.

### 3.3.1 LEGAL AND REGULATORY CONTEXT

Under the Uniform Relocation Assistance and Real Property Acquisition Policy Act of 1970, as amended, all federal agencies are required to meet certain standards for the fair and equitable treatment of persons displaced by federally supported actions. Relocation assistance will follow the guidelines set forth in Title 49, Part 24 of the Code of Federal Regulations (49 CFR Part 24).

### 3.3.2 METHODOLOGY

To identify potential displacements that would occur from implementing the project alternatives, the limit of disturbance for each Build Alternative was overlaid onto corridor parcel maps. Each of the parcels was then analyzed to determine if an acquisition was necessary and if the acquisition would displace a residence, a business, a community facility, or an institutional use. Not all land acquisitions result in a displacement. If land is acquired that does not include a residence, business, or institutional use, a displacement does not occur. Conversely, a partial acquisition could result in a displacement, even if it does not take a building. If a partial acquisition results in the inability to use the parcel as it was used prior to the acquisition, it would be a full displacement. For example, if all of the parking was taken from a business, the business would not be able to remain open and a displacement would occur. Land proffered for transit facilities by private landowners and land required from public agencies (County, VDOT, MWAA) is not considered to be an acquisition and has not been analyzed for displacements.

### 3.3.3 EXISTING CONDITIONS

A description of the existing conditions related to land use in the Dulles Corridor is provided in Section 3.1.

### 3.3.4 LONG-TERM EFFECTS

Permanent displacements, and relocations, and acquisitions are discussed below. Temporary uses of land are discussed in Section 3.3.5.

#### 3.3.4.1 Baseline Alternative

Under the Baseline Alternative, there would be no effects from the Dulles Corridor Rapid Transit Project. However, displacements or relocations could occur as a result of some of the projects assumed under this alternative. Identification of these effects would be the responsibility of the agencies and jurisdictions implementing the improvements.

### 3.3.4.2 BRT Alternative

#### Alignment BRT 1

Under Alignment BRT 1, partial acquisitions of private land would be required at several proposed facility locations: Wiehle Avenue Station, Reston Parkway Station, Herndon-Monroe Station, Route 28 Station, and the Route 772 Stop. Acquisitions and displacements of private land for Alignment BRT 1 are summarized in Table 3.3-1. Partial acquisition of two commercial properties is required to the south of Wiehle Avenue Station for pedestrian access. Two partial acquisitions of commercial property are required (one north and one south) at the Reston Parkway Station for bus transfer facilities. Partial acquisition of two commercial properties north of Herndon-Monroe Station is required for pedestrian access. Six partial acquisitions of land south of the Route 28 Station are required for bus transfer facilities and parking. In all cases, no displacements are anticipated.

The BRT Maintenance and Storage Facility (Site 14) may require the acquisition of one property and the displacement of up to two businesses. Two options for access to the facility are under consideration. Under Option 1, the construction of an access road into the facility would require the displacement of the 606 Outlet Deli and Rentals Unlimited, an equipment rental business. Under Option 2, the acquisition of one vacant property would be necessary to provide access to the facility. With the exception of Option 1 for access to the BRT Maintenance and Storage Facility, all other property acquisitions would be accomplished without the removal of residences, businesses, or institutional uses, allowing for continued use of the remainder of the properties.

**Table 3.3-1: Acquisitions and Displacements of Private Land Under Alignment BRT 1**

| | Acreage | Residential Properties | | Commercial Properties | |
|---|---|---|---|---|---|
| | | Acquisitions | Displacements | Acquisitions | Displacements |
| Orange Line Segment | 0 | 0 | 0 | 0 | 0 |
| Tysons Corner Segment | 0 | 0 | 0 | 0 | 0 |
| Mid-Corridor Segment | 11.9 | 0 | 0 | 12 | 0 |
| Dulles Airport Segment | 0 | 0 | 0 | 0 | 0 |
| Loudoun County Segment | 5.9 – 6.2 | 0 | 0 | 1 | 0 |
| Maintenance and Storage Facility | 1.6 – 2.0 | 0 | 0 | 1 | 0 - 2 |
| Total | 19.4 – 20.4 | 0 | 0 | 14 | 0 - 2 |

Acquisitions include full and partial acquisitions.

Given the large amount of vacant land within this part of Loudoun County, sufficient relocation opportunities exist for mini-mart and equipment rental facilities and no special relocation hardship is anticipated.

#### Alignment BRT 2

Acquisitions and displacements of private land for Alignment BRT 2 would be the same as those for BRT 1, except for the elimination of impacts at the Route 28 Station. Table 3.3-2 summarizes the acquisitions and displacements of private land required for Alignment BRT 2.

Given the large amount of vacant land within this part of Loudoun County, sufficient relocation opportunities exist for mini-mart and equipment rental facilities and no special relocation hardship is anticipated.

**Table 3.3-2: Acquisitions and Displacements of Private Land Under Alignment BRT 2**

| | Acreage | Residential Properties | | Commercial Properties | |
|---|---|---|---|---|---|
| | | Acquisitions | Displacements | Acquisitions | Displacements |
| Orange Line Segment | 0 | 0 | 0 | 0 | 0 |
| Tysons Corner Segment | 0 | 0 | 0 | 0 | 0 |
| Mid-Corridor Segment | 4.4 | 0 | 0 | 6 | 0 |
| Dulles Airport Segment | 0 | 0 | 0 | 0 | 0 |
| Loudoun County Segment | 5.9 – 6.2 | 0 | 0 | 1 | 0 |
| Maintenance and Storage Facility | 1.6 – 2.0 | 0 | 0 | 1 | 0 - 2 |
| Total | 11.9 – 12.6 | 0 | 0 | 8 | 0 - 2 |

Acquisitions include full and partial acquisitions.

### Alignment BRT 3

Acquisitions and displacements of private businesses for Alignment BRT 3 would be the same as those for BRT 1, except for the elimination of impacts at the Wiehle Avenue, Herndon-Monroe, and Route 28 stations, which are not included under Alignment BRT 3. Table 3.3-3 summarizes the acquisitions and displacements of private land required for Alignment BRT 3.

**Table 3.3-3: Acquisitions and Displacements of Private Land under Alignment BRT 3**

| | Acreage | Residential Properties | | Commercial Properties | |
|---|---|---|---|---|---|
| | | Acquisitions | Displacements | Acquisitions | Displacements |
| Orange Line Segment | 0 | 0 | 0 | 0 | 0 |
| Tysons Corner Segment | 0 | 0 | 0 | 0 | 0 |
| Mid-Corridor Segment | 3.7 | 0 | 0 | 2 | 0 |
| Dulles Airport Segment | 0 | 0 | 0 | 0 | 0 |
| Loudoun County Segment | 5.9 – 6.2 | 0 | 0 | 1 | 0 |
| Maintenance and Storage Facility | 1.6 – 2.0 | 0 | 0 | 1 | 0 - 2 |
| Total | 11.2 – 11.9 | 0 | 0 | 4 | 0 - 2 |

Acquisitions include full and partial acquisitions.

## 3.3.4.3 Metrorail Alternative

Table 3.3-4 summarizes the acquisitions and displacements of private land required for the Metrorail Alternative.

### Orange Line Connection

The Metrorail Alternative would not require land acquisition in this section.

**Table 3.3-4: Acquisitions and Displacements of Private Land under Metrorail Alternative**

| | Acreage | Residential Properties | | Commercial Properties | |
|---|---|---|---|---|---|
| | | Acquisitions | Displacements | Acquisitions | Displacements |
| Orange Line Segment | 0 | 0 | 0 | 0 | 0 |
| Tysons Corner Segment – T1 | 14.5 | 0 | 0 | 30 | 2 |
| Tysons Corner Segment – T6 | 18.3 | 0 | 0 | 35 | 3 |
| Tysons Corner Segment – T9 | 21.1 | 0 | 0 | 38 | 6 |
| Tysons Corner Segment – T4 | 23.8 | 0 | 0 | 54 | 5 |
| Mid-Corridor Segment | 20.3 | 9 | 0 | 22 | 0 |
| Dulles Airport Segment | 0 | 0 | 0 | 0 | 0 |
| Loudoun County Segment | 5.9 – 6.2 | 0 | 0 | 1 | 0 |
| S&I Yard | 83.6 – 105.5 | 0 | 0 | 4 | 0 |
| Total (varies by Alignment) | 124.3 – 170.0 | 9 | 0 | 57 – 81 | 2 – 6 |

Acquisitions include full and partial acquisitions.

### Tysons Corner

**Alignment T1.** Each of the three proposed stations with Alignment T1 would require acquisition of private land. At Tysons East and Tysons Central, land acquired would not result in the removal of structures or preclude existing uses on the remaining portions of the parcels. At Tysons West, land acquisition would displace two businesses: Templeton Dodge automobile sales and service and Security Moving and Storage. Relocation opportunities exist for auto sales/service and moving/storage businesses within Fairfax County. No special relocation hardship is anticipated. In addition a partial acquisition of private land would be required because access to the storage facility behind the Tysons West Station would be abandoned. New access to this facility would be provided via the station entrance on Tyco Road.

**Alignment T6.** Under Alignment T6, Tysons East and Tysons Central would have similar land acquisitions requirements as Alignment T1. At Tysons Central C, land acquired for the eastern entrance pavilion would result in the displacement of one business, Merchant's Tire and Auto. In addition, ventilation and emergency equipment shafts would be added to the sidewalks along the side of Route 7 above Tysons Central C. A partial acquisition may be needed in this area. At Tysons West, land displacement would be the same as for Alignment T1. Relocation opportunities and relocation hardships would be the same as for Alignment T1.

**Alignment T9.** Under Alignment T9 and the T9 Design Option, the land acquisitions and displacements for Tysons East, Tysons Central, Tysons Central C and Tysons West would be similar to Alignment T6, except for the displacement of the Business Bank building, the Shell gas station, and the First Virginia Bank building near the corner of Gosnell Road and Leesburg Pike (Route 7). Relocation opportunities and special relocation hardships for these businesses would be the same as for Alignment T6, except that the Tysons Central C Station would be aerial and thus would not require ventilation and emergency equipment shafts along Route 7.

**Alignment T4.** With Alignment T4, land acquired for proposed stations at Tysons East, Tysons Central A, Tysons Central B, and Tysons Central D would not result in the removal of structures or preclude existing uses on the remaining portions of the parcels. Tysons Central C would require the displacement of the Shell gas station and the Business Bank building. Tysons West would require the same displacements as Alignment T1, T6, T9, and T9 Design Option. Relocation opportunities and special relocation hardships for these businesses would be the same as for Alignment T1, T6, T9, and T9 Design Option.

#### Mid-Corridor
Land displacement at the Wiehle Avenue, Reston Parkway, Herndon-Monroe, and Route 28 stations would be the same as those described for BRT 1. No displacements would occur at these station locations or along the corridor. Land acquisition may be required along the Mid-Corridor to accommodate stormwater management ponds. An estimated eight residential and five commercial properties would be affected, with no displacements. Traction power substations and tie-breaker stations will require the partial acquisition of two residential and six commercial properties.

#### Dulles Airport
The Metrorail Alternative would not require land acquisition or displacements.

#### Loudoun County
Partial land acquisitions would be required for the Route 772 Station. Because none of the property acquisitions would require the removal of residences, businesses, or institutional uses, and because the partial acquisitions would not prevent the continued use of the remainder of the property, no displacements would occur.

#### Metrorail S&I Yard
Sites 7, 15, and 20 would require land acquisitions but would not require the removal of residences, businesses, or institutional uses, and thus would not require displacements.

### 3.3.4.4 BRT/Metrorail Alternative
Under the BRT/Metrorail Alternative, the Orange Line Connection and Tysons Corner land acquisitions and displacements would be the same as those described for the Metrorail Alternative from the DAAR to Tysons West with the addition of two partial acquisitions for the BRT ramp. Two business displacements would occur under Alignment T1, three business displacements would occur under Alignment T6, six business displacements would occur under Alignment T9, and five business displacements would occur under Alignment T4. Land acquisitions at the Wiehle Avenue, Reston Parkway, Herndon-Monroe, and Route 28 stations would be the same as those described for BRT. No displacements would occur at these station locations.

### 3.3.4.5 Phased Implementation Alternative
Under the Phased Implementation Alternative, acquisitions and displacements would be the same as those described for the Metrorail Alternative, with the following additional effects. The BRT Maintenance and Storage Facility could be located at Site 14, a BRT only facility, or Site 20, where it could be collocated with the Metrorail S&I Yard. If located at Site 14, the acquisitions and displacements described above under the BRT Alternative would occur. In addition, the two partial acquisitions needed for the BRT ramp from the DAAR to the Tysons West Station would also occur. When these ramps are no longer needed, they would again become available for non-transit use.

## 3.3.5 CONSTRUCTION EFFECTS

Property required for construction staging would be leased or otherwise acquired for temporary use. None of the property acquired would require permanent displacements. Therefore, no short-term construction impacts related to displacements or relocations would occur.

### 3.3.6 MITIGATION

Upon completion of more detailed design for the project, a detailed relocation plan will be developed to ensure that the orderly relocation of all displacees can be accomplished in a satisfactory manner. The acquisition of right-of-way and the relocation of displacees would be in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policy Act of 1970, as amended. Relocation resources would be available to all residential, business, and nonprofit displacees without discrimination.

### 3.3.7 SUMMARY OF EFFECTS

A summary of the potential acquisitions and displacements is presented in Table 3.3-5.

**Table 3.3-5: Summary of Displacement and Relocation Effects**

| Alternative | Residential Displacements | Commercial Displacements | Residential Acquisitions | Commercial Acquisitions | Mitigation |
|---|---|---|---|---|---|
| Baseline | None | None | None | None | None |
| BRT 1 | 0 | 0 to 2 | 0 | 14 | In accordance with the Uniform Relocation Assistance and Real Property Policy Act of 1970, as amended. |
| BRT 2 | 0 | 0 to 2 | 0 | 8 | In accordance with the Uniform Relocation Assistance and Real Property Policy Act of 1970, as amended. |
| BRT 3 | 0 | 0 to 2 | 0 | 4 | In accordance with the Uniform Relocation Assistance and Real Property Policy Act of 1970, as amended. |
| Metrorail T1 | 0 | 2 | 9 | 57 | In accordance with the Uniform Relocation Assistance and Real Property Policy Act of 1970, as amended. |
| Metrorail T6 | 0 | 3 | 9 | 62 | In accordance with the Uniform Relocation Assistance and Real Property Policy Act of 1970, as amended. |
| Metrorail T9 | 0 | 6 | 9 | 65 | In accordance with the Uniform Relocation Assistance and Real Property Policy Act of 1970, as amended. |
| Metrorail T4 | 0 | 5 | 9 | 81 | In accordance with the Uniform Relocation Assistance and Real Property Policy Act of 1970, as amended. |
| BRT/Metrorail | 0 | 2 to 8 | 0 | 47 to 70 | In accordance with the Uniform Relocation Assistance and Real Property Policy Act of 1970, as amended. |
| Phased Implementation | 0 | 2 to 8 | 9 | 60 to 84 | In accordance with the Uniform Relocation Assistance and Real Property Policy Act of 1970, as amended. |

## 3.4 VISUAL AND AESTHETIC CONDITIONS

This section presents the results of a visual impacts analysis of the proposed Dulles Corridor Rapid Transit Project. Additional detail is provided in the *Visual and Aesthetic Assessment Technical Report* (June 2002).

### 3.4.1 METHODOLOGY

The Federal Transit Administration (FTA) does not have its own methodology or guidelines for conducting visual assessments of transit projects. Therefore, the analysis conducted used the Federal Highway Administration (FHWA) visual assessment methodology. The following steps were used in the analysis:

- The study area was defined by dividing the Dulles Corridor into visual assessment units, which are relatively homogeneous areas of similar visual character. Figure 3.4-1 illustrates the boundaries of these visual assessment units.
- Each visual assessment unit was evaluated for existing visibility, visual character, quality of views, and presence of important visual resources.
- The types of viewers present in each visual assessment unit were identified. Different types of viewers have different levels of sensitivity to visual changes based on their familiarity with the environment, what they are doing, how much time they spend looking at the environment, and their sense of ownership of the view.
- Project plans, photographs, computer-generated visual simulations, and artist renditions of the project were reviewed regarding the visible physical changes that would occur.
- The visual impact of the project's visible physical changes was assessed and classified into three basic categories: substantial, less than substantial, and minimal visual impacts. Substantial visual impacts of a transportation project are those that would result in a deterioration in the ability to use the adjacent land as intended, a reduction in the quality of that use, obstruction of an important view, interference with a specific design in the environment, degradation of a natural condition, removal of a substantial percentage, or the last amount of, landscaping or natural vegetation, and similar levels of visual disturbance. Less than substantial impacts are those visual effects that would not result in these conditions. Minimal visual impacts are those where the visible changes would be barely noticeable to the general public.
- If substantial visual impacts were identified, mitigation was developed, if available, to reduce the impacts.

### 3.4.2 EXISTING CONDITIONS

The Dulles Corridor is located within an area that has undergone and is undergoing continued development. In the last few years, office, industrial, and mixed-use development has occurred in much of the study area, especially in the vicinity of Tysons Corner, Reston-Herndon, and, more recently, Loudoun County. Portions of the corridor contain older residential developments.

For visual analysis purposes, the corridor can be divided into five distinct regions, referred to as visual assessment units. From east to west, these are the Orange Line Connector, Tysons Corner, Mid-Corridor, Dulles Airport, and Dulles Greenway visual assessment units. The existing visual conditions in each of these areas are discussed below, and representative photographs of the Dulles Corridor are shown in Figures 3.4-2a through 3.4-2e.

### 3.4.2.1 Orange Line Connection Visual Assessment Unit

The Orange Line Connection visual assessment unit begins at the eastern end of the corridor, along I-66, continues along the Dulles Connector Road between I-66 and Route 123, and ends at the Dulles Connector Road/Route 123 interchange.

This area is characterized by mostly residential development, with a small amount of office/commercial space at the I-66/Dulles Connector Road interchange and at the Dulles Connector Road/Route 123 interchange. This visual assessment unit also encompasses the existing West Falls Church Metrorail Station and the West Falls Church Metrorail Service and Inspection Yard.

There is little visibility between I-66, the Dulles Connector Road, and the surrounding areas due to sound barriers and dense landscaping. Because of this limited visibility, the viewers in this portion of the corridor are generally only the highway users, drivers or passengers, as well as the people in the West Falls Church facility, including Metrorail riders or Metrorail workers.

The existing visual character in this visual assessment unit is that of a narrow, enclosed transportation facility, with short views of landscaping, sound barriers, and the traffic within the corridor. While some landscaping occurs in the median, especially at the interchanges, there are no distinctive views or focal points within the visual assessment unit and no highly sensitive viewers.

### 3.4.2.2 Tysons Corner Visual Assessment Unit

The Tysons Corner visual assessment unit begins where the corridor leaves the Dulles Connector Road at the Route 123 interchange, and ends where it enters the DAAR at the Route 7 interchange. It includes the areas along Route 123, Route 7, and Westpark Drive. It also includes a small area along the DAAR adjacent to the existing Tysons-West*Park Transit Station. The various planned developments in this unit provide an area that is visually diverse. Land uses include large-scale indoor commercial (such as shopping malls), large-scale outdoor commercial (such as auto dealerships), small-scale commercial (strip malls and small freestanding businesses), hotel and restaurant commercial, office commercial, light-industrial and warehousing, and multi-family residential. Smaller areas of other land uses, such as institutional and transportation facilities, also occur in this unit. Some areas are still being developed.

Visibility is varied between the corridor and the surrounding development in the Tysons Corner visual assessment unit. The tall buildings and the varied topography allow for generally open views. Viewers at some distance from the corridor can see into it, especially from tall office buildings, hotels, and apartments or condominiums. These distant views are a highly prized asset of viewers in this unit.

Viewers within this visual assessment unit include the residents in the apartments and condominiums, as well as temporary residents in hotels; people who work in Tysons Corner in offices, businesses, and stores; and people traveling through Tysons Corner on the roadway network. Of these, the residents in the apartments and condominiums are the most sensitive viewers due to their familiarity with the views and their sense of ownership. The temporary hotel guests are often sensitive to visual quality, especially if they are tourists, but less sensitive to visual change because of their lack of familiarity with the surroundings. Some workers in offices with views could be highly sensitive, with a strong level of familiarity and sense of ownership that is similar to residents.

The aesthetic character in the Tysons Corner visual assessment unit is variable. The topography is rolling, with many steep slopes and a few areas with high retaining walls. Landscaping is abundant and a few areas of

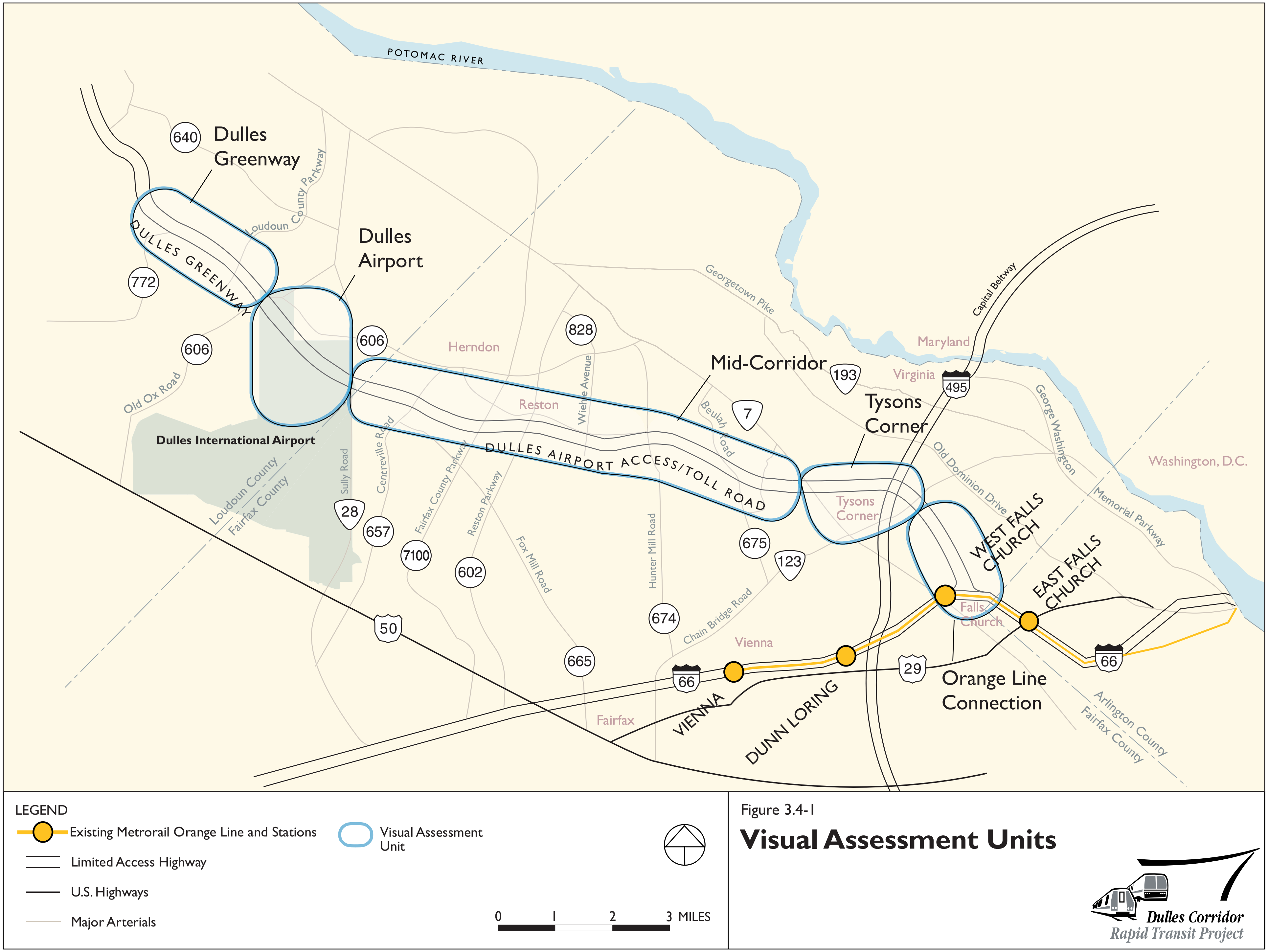



Figure 3.4-1

# Visual Assessment Units

I-66/West Falls Church Station and Service and Inspection Yard

Typical Sound Barrier

I-66/Metrorail Orange Line Alignment

Figure 3.4-2a

## Orange Line Connection

Tysons Corner at Route 7

Rotonda Residential Complex

Tysons Corner at Route 123

Figure 3.4-2b

# Tysons Corner

Mid-Corridor Residential Community with Dulles Airport Access Road and Dulles Toll Road in Background

Dulles Airport Access Road and Dulles Toll Road Collection Facility

Mid-Corridor Office Building

Figure 3.4-2c

# Mid-Corridor

Dulles Corridor
Rapid Transit Project

Dulles Airport Terminal and Tower

Dulles Airport Terminal and Tower

Dulles Airport Terminal and Tower

Figure 3.4-2d

## Dulles Airport

Dulles Corridor
Rapid Transit Project

Dulles Greenway

Dulles Greenway

Dulles Greenway

Figure 3.4-2e

## Loudoun County

Dulles Corridor
Rapid Transit Project

naturalized open space exists. Many of the buildings are large, and some have a distinctive architectural style. Entry monumentation and signage are also important components of many views. The few areas that lack distinctive design tend to occur along Route 7, where standard "strip commercial" and auto sales lots are interspersed with the more typical distinctive architecture and landscaping.

A number of important views and focal points are located in this visual assessment unit, including the two malls (Tysons Corner Center and Tysons II Galleria), large hotels such as the Ritz Carlton, The Rotonda condominiums, and several office buildings.

#### 3.4.2.3 Mid-Corridor Visual Assessment Unit

The Mid-Corridor visual assessment unit starts at the Route 7 (Leesburg Pike) crossing of the DAAR and Dulles Toll Road and extends to the Route 28 interchange (Loudoun County line). It has two distinct characters. East of the Hunter Mill underpass, this area is characterized by mostly low-density residential development, and also includes the Wolf Trap Farm Park for the Performing Arts and its associated facilities. A considerable amount of open space remains in the eastern part of this visual assessment unit.

West of the Hunter Mill Road underpass, this portion of the visual assessment unit is characterized by planned office commercial development and a limited number of residential land uses. Much of this area is still developing, as evidenced by open space and areas of ongoing construction.

The DAAR has a landscaped median approximately 65 feet in width, bordered by two lanes in each direction, providing access only to and from the airport. The DAAR is flanked on both sides by additional medians and the Dulles Toll Road, which consists of three lanes in each direction and provides local access. The center median of the DAAR is predominantly planted with grass. Small stands of trees are found periodically within the center median. East of the Hunter Mill Road underpass, sound barriers and dense landscaping allow little visual access between the DAAR and Dulles Toll Road, and the surrounding area. Because of this limited visibility, the viewers in this portion of the study area are generally only the highway users—drivers or passengers. West of Hunter Mill Road, fewer noise walls and taller buildings allow greater visual access between the DAAR and Dulles Toll Road and the surrounding areas than in the eastern portion. Viewers include not only the DAAR and Dulles Toll Road users, but also the office workers in buildings bordering the corridor. Some workers in offices with views could be highly sensitive viewers, with a familiarity and sense of ownership similar to residents. The few residents with views of the corridor in this portion of the visual assessment unit would also be highly sensitive for the same reasons.

The existing aesthetic character in the eastern portion of this visual assessment unit is that of a narrow, enclosed transportation facility (though it is wider than in the Orange Line Connection visual assessment unit), with short views of landscaping, sound barriers, and the traffic within the corridor. Some landscaping is present in the median. These short stretches of median landscaping and berming are important visual features because they offer relief from a long, relatively featureless roadway segment, especially in the limited-exit DAAR. The views from the outer toll lanes offer more variety, with frequent interchanges and landscaped outer shoulders. These are the only focal points within this portion of the visual assessment unit. Signage for the Wolf Trap Farm Park indicates a visual resource that is out of sight behind sound barriers and landscaping. No highly sensitive viewers are within the eastern portion of this visual assessment unit because the existing corridor is generally only visible from the roadways, not the surrounding areas.

Several buildings with distinctive architectural character serve as focal points in the western portion of the Mid-Corridor visual assessment unit.

#### 3.4.2.4 Dulles Airport Visual Assessment Unit

The Dulles Airport visual assessment unit starts at the Dulles Toll Road/Route 28 interchange (near the Loudoun County line) and continues to the airport, ending where the corridor joins the Dulles Greenway. Airport-related land uses dominate this visual assessment unit, including parking lots, the terminal, the tower, runways and taxiways, and rental car facilities. The relative lack of buildings gives this area an open character.

The openness of this unit allows for extensive visibility. However, views from the single largest building—the terminal—are limited because of its lack of low windows.

Views of the various historic structures from the main terminal roadways, depending on the location of the viewer, are the important visual experiences planned by the airport's architect, Eero Saarinen. This "peekaboo" sequence of views heightens viewer interest and tends to make viewers work hard to get a glimpse of the facilities. Saarinen took into consideration that people would be viewing the terminal while in motion, usually approaching the facility by car. He designed the approach road on the original flat plain to provide a variety of views of the Main Terminal and control tower from different points along it. As one approaches the airport from the east, each element in the peekaboo sequence is a result of Saarinen's careful planning, which reveals increasingly greater views of the terminal and tower and creates a sense of dramatic expectation. The upper and middle portion of the control tower becomes visible first, then largely disappears behind trees. Then the upper portion of the tower again comes into view across the airfield. Again the tower disappears, appears, and disappears as motorists continue towards the airport. The fourth time the tower is visible it is framed by trees. On the fifth view, the tower, and then gradually the terminal, are visible. This view is briefly obstructed, and then the terminal building is fully visible when the motorist enters the loop roadway in front of the terminal. Figure 3.4-3 illustrates this peekaboo sequence.

Viewers in this visual assessment unit all relate to the airport itself, including workers and travelers. Many of the travelers (specifically the tourists) have high sensitivity to visual quality, but low sensitivity to visual change from their lack of familiarity with the surroundings. The terminal and the tower are two related focal points in the Dulles Airport visual assessment unit and are the largest structures in the area. These two features are important architecturally as well as historically; they have been designated, along with other airport structures, as eligible for listing on the National Register of Historic Places (see Section 3.5.1). Building restrictions in the vicinity of the airport prohibit structures that would divert attention from the tower and terminal. In particular, there are height restrictions for nearby development.

#### 3.4.2.5 Dulles Greenway Visual Assessment Unit

The Dulles Greenway visual assessment unit starts at the northwestern edge of the airport, adjacent to the Dulles Greenway, and ends at the western corridor terminus near Route 772. Much of this area is undeveloped or developing, with relatively large tracts of forest and gentle topography. The Loudoun County *Revised General Plan* anticipates development in this area, specifically around future transit facilities. The existing development is generally industrial or warehouses. The relatively flat topography and low-degree of development provide extensive visibility. Viewers in this visual assessment unit are mostly motorists on the roadways and the workers in industrial buildings. There are no substantial focal points within this visual assessment unit.

### 3.4.3 LONG-TERM EFFECTS

Analysis of visual impacts involves visible physical changes and the reaction of viewers to these changes. The sensitivity of viewers' affect whether a visible physical change would have an adverse or beneficial visual impact.

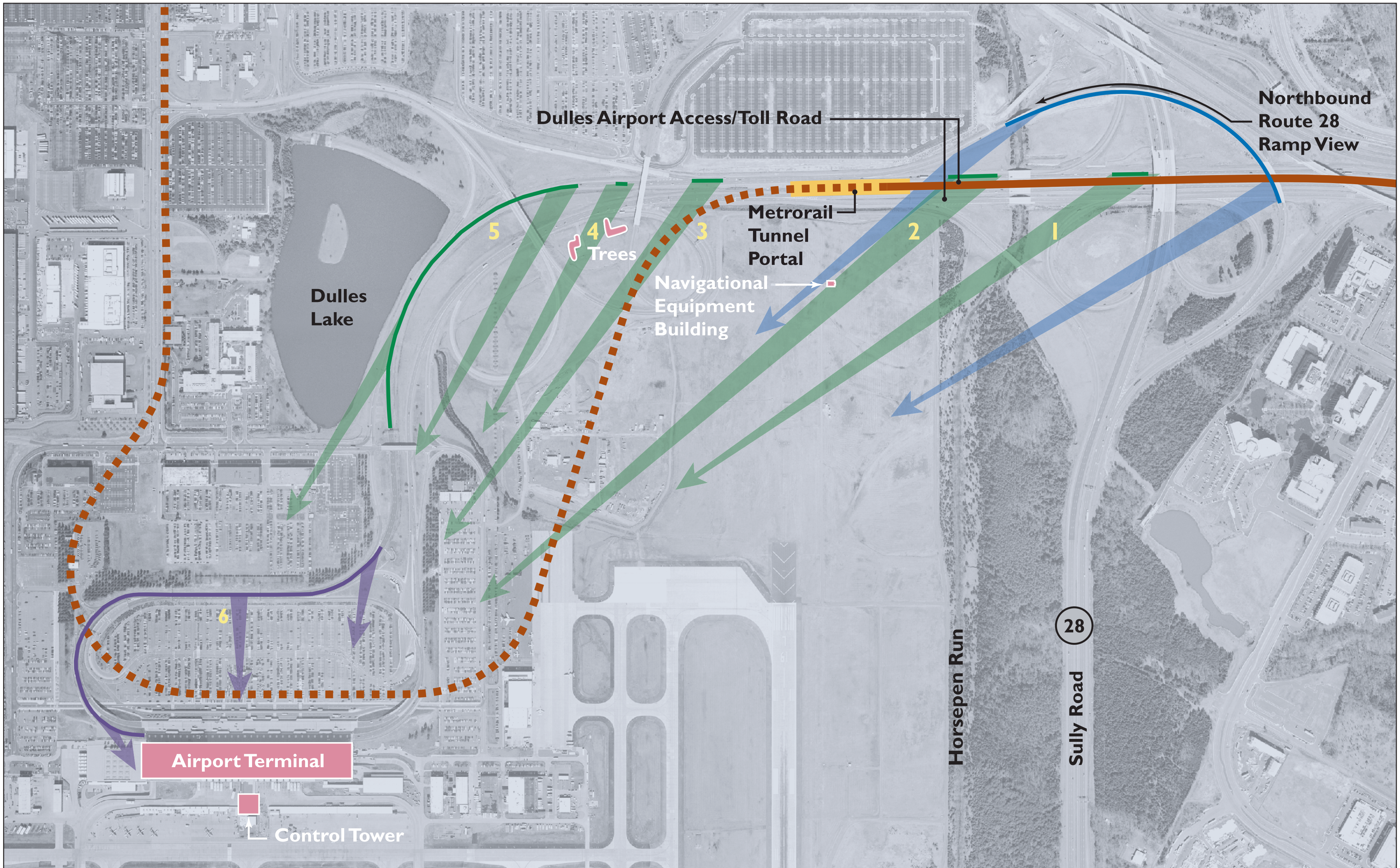



Figure 3.4-3

# View Corridors Dulles Airport Terminal and Control Tower

#### 3.4.3.1 Baseline Alternative

No effects from the Dulles Corridor Rapid Transit Project would occur under the Baseline Alternative. However, the improvements assumed under this alternative could result in visual and aesthetic effects, which would be the responsibility of those agencies and jurisdictions implementing the improvements.

#### 3.4.3.2 BRT Alternative

**Alignment BRT 1**

Table 3.4-1 lists the physical changes that would result from the BRT 1 alignment by visual assessment unit. It provides information about the visibility of these changes, the expected viewer reaction based on viewer sensitivity, and whether a substantial visual impact would occur as a result of the physical change.

A typical DAAR median station is shown in Figure 3.4-4.

**Table 3.4-1. Visual Impacts of Alignment BRT 1**

| Physical Changes | Visibility From | Types of Viewers | Viewer Sensitivity[1] | Visual Impact[2] |
|---|---|---|---|---|
| **Orange Line Connection Visual Assessment Unit** | | | | |
| BRT alignment in Dulles Connector Road (existing lanes), including new ramps | Dulles Connector Road | Motorists and transit riders | Moderate | Minimal |
| Existing West Falls Church Station reconfigured for BRT use | West Falls Church Station | Transit riders and workers | Moderate | Minimal |
| Layover and welfare facility in center of I-66/Dulles Connector Road interchange | I-66, Dulles Connector Road West Falls Church Station | Motorists, transit riders, transit workers | Moderate | Less than substantial (see text) |
| **Tysons Corner Visual Assessment Unit** | | | | |
| BRT alignment in DAAR (existing lanes) | DAAR, Dulles Toll Road, some adjacent land uses | Motorists, transit riders, misc. viewers in adjacent land uses | Moderate | Minimal |
| | | Residents | High | Minimal |
| Spring Hill Road Station (center-median of DAAR) | DAAR, Dulles Toll Road, International Drive, Jones Branch Drive, transit center, some adjacent land uses | Motorists, transit riders, misc. viewers in adjacent land uses | Moderate | Less than substantial |
| | | Residents | High | Less than substantial |
| **Mid-Corridor Visual Assessment Unit** | | | | |
| BRT alignment in DAAR (existing lanes) | DAAR, Dulles Toll Road, crossing roads, plus some adjacent land uses (though mostly screened by soundwalls, landscaping, topography in the eastern portion) | Motorists, transit riders, misc. viewers in adjacent land uses | Moderate | Minimal |
| | | Residents | High | Minimal |
| Wiehle Avenue and Reston Parkway BRT stations (center median of DAAR) | DAAR, Dulles Toll Road, Wiehle Avenue, Reston Parkway, adjacent parking areas, adjacent office buildings, adjacent roadways | Motorists, transit riders, office workers | Moderate | Less than substantial |

| Physical Changes | Visibility From | Types of Viewers | Viewer Sensitivity[1] | Visual Impact[2] |
|---|---|---|---|---|
| Herndon-Monroe BRT Station (center median of DAAR) | DAAR, Dulles Toll Road, adjacent parking areas, adjacent office buildings, adjacent roadways | Motorists, transit riders, office workers | Moderate | Less than substantial (see text) |
| Route 28 BRT Station (center median of DAAR) | DAAR, Dulles Toll Road, adjacent roadways, adjacent residents | Motorists, transit riders | Moderate | Less than substantial |
| | | Residents | High | Less than substantial (see text) |
| **Dulles Airport Visual Assessment Unit** | | | | |
| BRT alignment (on existing airport roads) | Airport roadways, terminal, parking areas, other airport uses | Motorists, transit riders, | Moderate | None |
| | | Airport workers, air travelers | High | None |
| BRT Maintenance and Storage Facility (adjacent to Dulles Greenway and Route 606) | Dulles Greenway, Route 606, commercial land uses | Motorists and transit riders, commercial viewers | Moderate | Less than substantial (see text) |
| Dulles Airport BRT Stop (curbside, with facilities inside terminal) | Airport roadways, terminal, parking areas, other airport uses | Motorists, transit riders, airport workers | Moderate | Less than substantial |
| | | Airport workers, air travelers | High | Less than substantial (see text) |
| **Dulles Greenway Visual Assessment Unit** | | | | |
| BRT alignment in Dulles Greenway (existing lanes), including new ramps | Dulles Greenway | Motorists and transit riders | Moderate | Minimal |
| Route 606 BRT Stop in Dulles North Transit Center (under construction) with adjacent facilities | Dulles Greenway, Dulles Transit Center | Motorists and transit riders | Moderate | Minimal |
| Route 772 BRT Stop (adjacent to Dulles Greenway) | Dulles Greenway | Motorists and transit riders | Moderate | Minimal |

1View sensitivity levels are discussed in Section 3.4.1
2 Substantial visual impacts are those that result in deterioration in the ability to use the adjacent land as intended, a reduction in the quality of that use, obstruction of an important view, interference with a specific design in the environment, degradation of a natural condition, removal of a substantial portion or the last amount of landscaping or the natural vegetation, or similar levels of visual disturbance. Less than substantial impacts are those visual effects that would not result in these conditions. Minimal visual impacts are those that would be barely noticeable to the general public.

A new layover and welfare facility is planned near the middle of the I-66/Dulles Connector interchange in the Orange Line Connection visual assessment unit. This area currently consists of landscaping that would be removed for buildings and parking areas. Viewers in this area are primarily motorists and transit workers, and the visual impact would be less than substantial.

To accommodate the greater parking demand expected at the Herndon-Monroe Station, two additional parking structures would be constructed south of the DAAR and Dulles Toll Road, to the east and west of the existing Herndon-Monroe Park-and-Ride. The parking structure to the east would be built in the existing parking lot, while the structure to the west of the existing park-and-ride would be built in an undeveloped area. The western parking structure would remove a small area of forest. This area is visible from only the park-and-ride, the adjacent highways, and the commercial development across the DAAR and Dulles Toll Road, so the

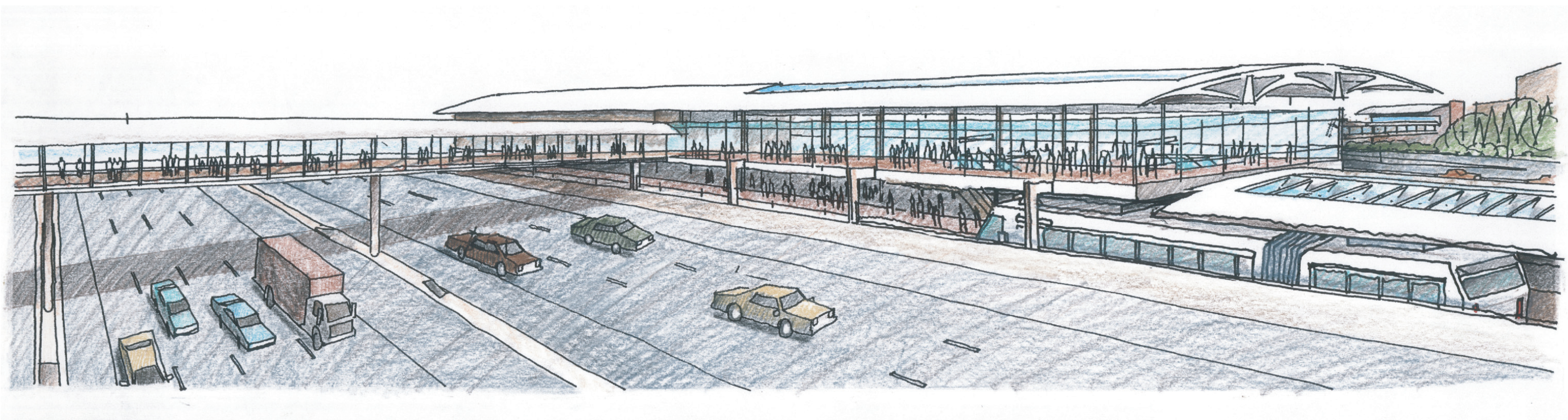


Figure 3.4-4

**Typical DAAR Median Station (BRT)**

Dulles Corridor Rapid Transit Project

visual impact of the new parking structures would be less than substantial.

The station at Route 28 would include an entrance pavilion in areas that are currently undeveloped or currently being developed. By the time the station would be constructed, development near the proposed south entrance pavilion would include office uses similar to those at the other Mid-Corridor stations, so visual impacts would be less than substantial. At the proposed site of the north entrance pavilion, residences are currently being constructed as part of the Dulles Greens development. Views of the transit facility from these residences would be screened by landscaping required of the Dulles Greens developer and by enhanced landscaping proposed as part of this project. Visual impacts at the north entrance pavilion would be less than substantial.

The Dulles Airport BRT Stop would place the BRT loading area along the curb of the Ground Transportation Road, across the Arrival and Departure Roads from the terminal. The fare area would be within the terminal building. The viewers at the Dulles Airport BRT Stop include motorists, transit riders, airport workers, and air travelers, all of who would be highly sensitive to visual quality. Travelers are often tourists and the airport is their first introduction to the Washington, D.C. area. Because of the renowned architectural and historic context of the terminal and associated buildings, awareness of design and expectations of visual quality are high. The Dulles Airport BRT Stop was designed to ensure that it would have no visual effects on the character of the Dulles Airport terminal. Accordingly, anticipated visual changes would be minor, and even in the highly sensitive context, would not represent a substantial visual impact.

Subject to FAA approval, a new BRT Maintenance and Storage Facility would be constructed near the Dulles Greenway/Route 606 interchange on MWAA property (Site 14). The land to be used for this facility is mostly forested and would have to be cleared. The surrounding viewers would be motorists on the adjacent Route 606 and Dulles Greenway, and commercial/industrial viewers on the surrounding land. Therefore, visual impacts would be less than substantial.

#### Alignment BRT 2

BRT 2 would be similar to BRT 1, except that there would not be new BRT stations at Spring Hill Road and Route 28. Instead of a new station at Spring Hill Road, BRT 2 would include a new BRT stop at the existing Tysons-West*Park Transit Station. Minor reconfiguration of this transit station would be necessary to accommodate the BRT operations. Existing ramps would be used to access the stop. The visual impacts of these minor changes would be minimal, even less than those of a new BRT station, as proposed under BRT 1. No facilities would be provided at Route 28. Elsewhere, visual impacts related to BRT 2 would be identical to those discussed for BRT 1.

#### Alignment BRT 3

BRT 3 would be similar to BRT 1, except that there would not be new BRT stations at Spring Hill Road, Wiehle Avenue, Herndon-Monroe, and Route 28. The station at Reston Parkway would also be different under BRT 3. No facilities would be provided at Route 28. Instead of new stations at Spring Hill Road, Wiehle Avenue, and Herndon-Monroe, Alignment BRT 3 would have new BRT stops at the existing transit centers. Minor reconfigurations of the transit centers would be necessary to accommodate the BRT operations. Existing roadways would be used to access the stops. The visual impacts of these minor changes would be minimal, even less than those of new BRT stations, as proposed under BRT 1.

At the Reston Parkway BRT Station, a multi-level station would be constructed in the center median of the DAAR, as shown in Figure 3.4-5, instead of the at-grade station proposed under BRT 1. The lowest level would be used for the BRT vehicles. The middle level would be empty, but reserved for future use as a

Metrorail station. The top level would be a pedestrian mezzanine that would provide access to the pedestrian bridges and the facilities north and south of the DAAR and Dulles Toll Road. This station would be visible from the surrounding roadways and office development on either side of the highways. The height of the three-level station, approximately 72 feet above the existing roadway, would be a dominant element in the middle of the DAAR, but would not be inconsistent with the tall structures on either side of the roadway. This station would become a major focal point along the DAAR and Dulles Toll Road. The visual impact would be substantial, but not adverse.

Elsewhere, visual impacts related to BRT 3 would be identical to those discussed for BRT 1.

### 3.4.3.3 Metrorail Alternative

Table 3.4-2 lists the physical changes by visual assessment unit for the Metrorail Alternative and provides information about the visibility of these changes, the expected viewer reaction based on viewer sensitivity, and whether a substantial visual impact would occur as a result of the physical change. Typical elements of the Metrorail system including aerial and at-grade structures, portals, bents, and vents, are shown in Figure 3.4-6a and 3.4-6b. Construction staging areas are also shown in Figure 3.4-6b.

#### Orange Line Connection Visual Assessment Unit

In the Orange Line Connection visual assessment unit, a new Metrorail bridge would be constructed over Pimmit Run. Pimmit Run Stream Valley Park is located on either side of the Dulles Connector Road, with an informal trail along Pimmit Run connecting the two park halves through the highway right-of-way. The new bridge would block the light between the two existing Dulles Connector bridges along this trail, creating a relatively dark "tunnel" effect. Viewers at this location are recreational trail users, who are highly sensitive to visual quality changes. Therefore, a substantial visual effect would occur.

#### Tysons Corner Visual Assessment Unit

All alignment options will have elevated viaducts and stations throughout Tysons Corner. The elevated alignment traverses primarily along relatively wide roadways and as such the visual impact would generally not be as substantial. However, only Alignment T4, the elevated alignment that would pass very near the entry of the Courtyard by Marriott hotel, providing close-up views of the structure from the hotel rooms and into the rooms from the train. Because it would be located on the south side of the hotel, the elevated alignment would also create large new areas of shadow along the front façade of the hotel. The views of the structure and the heavy shadowing could reduce the use of the affected rooms. These physical changes would also greatly alter the view of the front of this business, including the entrance. The visual impacts related to the proximity of the elevated alignment to the hotel and the shadows created would be substantial.

Most of the alignment options proposed in Tysons Corner would use relatively wide roadways, such as Route 123 and Route 7 (see Figure 3.4-7). For Alignment T4, however, Westpark Drive would be used for part of the route. Westpark Drive is relatively narrow, with trees lining the street. The elevated structure, located along the south side of Westpark Drive for the eastern portion and along the north side of the roadway for the western portion, would require the removal of some street trees and would dominate the views along this street. Many of the viewers in this area are residential. Therefore, the combination of the removal of street trees, an out-of-scale structure, and highly sensitive viewers would result in substantial visual impacts.

A substantial visual impact would also occur with Alignment T4 at the intersection of Westpark Drive and Route 7, where the westbound alignment would be very close to an existing office building in the northeast quadrant of this intersection. This office building has a distinctive entry, utilizing the steep topography of the

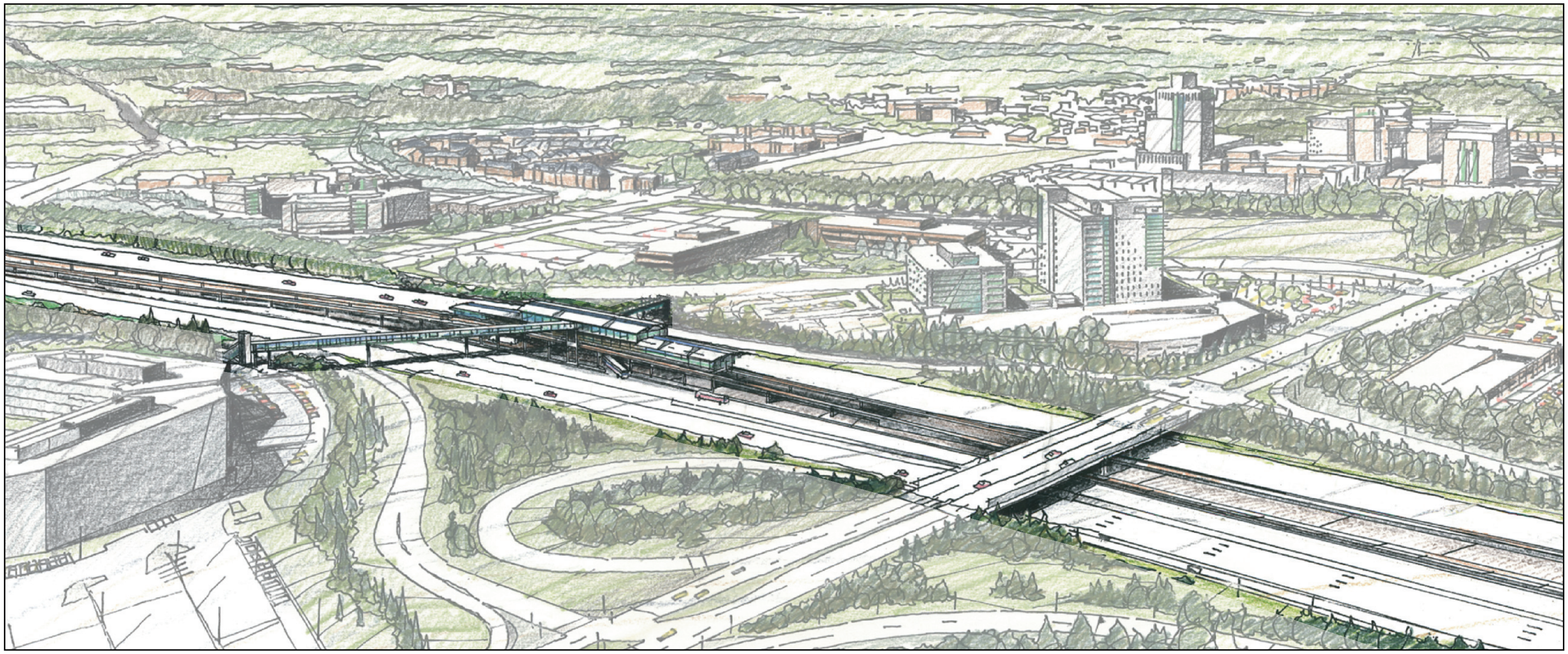


Figure 3.4-5

## Reston Parkway Station (BRT 3)

Dulles Corridor
Rapid Transit Project

Metrorail Double-Track
Aerial Alignment

Metrorail Alignment - At Grade

Tunnel Portal

Figure 3.4-6a

# Typical Elements of the Metrorail System

Dulles Corridor
Rapid Transit Project

Elevated Metrorail Supported by Bents

Tunnel Vent

Construction Staging Area

Figure 3.4-6b

## Typical Elements of the Metrorail System

Dulles Corridor
Rapid Transit Project

**Table 3.4-2: Visual Impacts of Metrorail Alternative**

| Physical Changes | Visibility From | Types of Viewers | Viewer Sensitivity[1] | Visual Impact[2] |
|---|---|---|---|---|
| **Orange Line Connection Visual Assessment Unit** | | | | |
| Metrorail alignment in Dulles Connector Road center median, including new rail yard lead, traction power substation | Dulles Connector Road | Motorists, transit riders | Moderate | Minimal |
| West Falls Church Metrorail Yard improvements, including additional storage tracks, traction power substation | West Falls Church Station | Transit workers | Moderate | Minimal |
| New Metrorail bridge over Pimmit Run | Dulles Connector Road, Pimmit Run Stream Valley Park | Motorists, transit riders | Moderate | Minimal |
| | | Recreational trail users | High | Substantial (see text) |
| **Tysons Corner Visual Assessment Unit** | | | | |
| Alignment T1: Elevated alignment along Route 123 and Route 7; underground alignment along Route 123 and Route 7; portals on Route 123 and Route 7 | Route 123, Route 7, intersecting and parallel roadways, adjacent commercial and uses along Route 123 and Route 7, distant residences | Motorists, transit riders, office/commercial viewers | Moderate | Substantial (see text) |
| | | Residents (distant) | Moderate | Less than substantial |
| Alignment T6: Elevated alignment along Route 123 and Route 7; underground alignment along Route 123 and Route 7; portals on Route 123 and Route 7 | Route 123, Route 7, intersecting and parallel roadways, adjacent commercial and uses along Route 123 and Route 7, distant residences | Motorists, transit riders, office/commercial viewers, | Moderate | Substantial (see text) |
| | | Residents (distant) | Moderate | Less than substantial |
| Alignment T9: Elevated alignment along Route 123 and Route 7, with tunnel portion between Tysons Central Station and Route 123/Route 7 interchange | Route 123, Route 7, intersecting and parallel roadways, adjacent commercial and uses along Route 123 and Route 7, distant residences | Motorists, transit riders, office/commercial viewers, | Moderate | Substantial (see text) |
| | | Residents (distant) | Moderate | Less than substantial |
| Alignment T4: Elevated couplet alignment along Route 123, Route 7, Westpark Drive | Route 123, Route 7, Westpark Drive, intersecting and parallel roadways, adjacent commercial and uses along Route 123, Route 7, and Westpark Drive, Courtyard by Marriott hotel, adjacent residents along Westpark Drive, distant residences | Motorists, transit riders, office/commercial viewers | Moderate | Substantial (see text) |
| | | Residents (adjacent), hotel guests, employees | High | Substantial (see text) |
| | | Residents (distant) | Moderate | Less than substantial |
| Tysons East Station (any alignment): elevated; including traction power substation | Route 123, Scotts Crossing/Colshire Drive; adjacent offices; nearby residences | Motorists, transit riders, office workers | Moderate | Less than substantial |
| | | Residents | High | Less than substantial (see text) |
| Tysons West Station (any alignment): elevated; including BRT connector ramps to DAAR, intermodal facility | DAAR, Dulles Toll Road, Route 7, Westwood Center Drive/Tyco Road adjacent offices, nearby hotels, commercial uses; distant residences | Motorists, transit riders, office workers, commercial viewers, hotel guests, employees, distant residents | Moderate | Less than substantial |

| Physical Changes | Visibility From | Types of Viewers | Viewer Sensitivity[1] | Visual Impact[2] |
|---|---|---|---|---|
| Tysons Central Station (any alignment) (Tysons Central D under Alignment T4): elevated; including traction power substation | Route 123, Tysons Boulevard, adjacent and nearby commercial uses (malls) | Motorists, transit riders, commercial viewers | Moderate | Substantial (see text) |
| Tysons Central C (Alignment T6 only): underground with aboveground entrance pavilions; or Tysons Central C (Alignment T9 or T4): elevated | Route 7, adjacent commercial uses, adjacent offices | Motorists, transit riders, commercial viewers, office workers | Moderate | Less than substantial |
| Tysons Central A (Alignment T4 only): elevated | Westpark Drive, West Branch Drive, Jones Branch Drive; adjacent offices | Motorists, transit riders, office workers | Moderate | Substantial (see text) |
| Tysons Central B Station (Alignment T4 only): elevated, including traction power substation | Westpark Drive, International Drive; adjacent offices, adjacent residences | Motorists, transit riders, office workers | Moderate | Less than substantial |
| | | Residents | High | Substantial (see text) |
| **Mid-Corridor Visual Assessment Unit** | | | | |
| Metrorail alignment in DAAR (center median), including removal of median landscaping | DAAR, Dulles Toll Road, crossing roads, plus some adjacent land uses (though mostly screened by soundwalls, landscaping, topography) | Motorists, transit riders, misc. viewers in adjacent land uses | Moderate | Substantial (see text) |
| | | Residents | High | Minimal |
| Wiehle Avenue, Reston Parkway, Herndon/Monroe Metrorail stations (center median of DAAR) | DAAR, Dulles Toll Road, Wiehle Avenue, Reston Parkway, adjacent parking areas, adjacent office buildings, adjacent roadways | Motorists, transit riders, office workers | Moderate | Less than substantial |
| Route 28 Metrorail Station (center median of DAAR) | DAAR, Dulles Toll Road, adjacent roadways, adjacent residents | Motorists, transit riders | Moderate | Less than substantial |
| | | Residents | High | Less than substantial (see text) |
| Traction Power Substation along DAAR/Dulles Toll Road, including one near the Barns at Wolf Trap | DAAR, Dulles Toll Road, plus potentially the Barns at Wolf Trap | Motorists, transit riders | Moderate | Less than substantial (see text) |
| Worker and visitors to the Barns at Wolf Trap (potentially) | High | Potentially substantial (see text) | | |
| New Metrorail bridge over Difficult Run | DAAR, Dulles Toll Road, Difficult Run Stream Valley Park | Motorists, transit riders | Moderate | Minimal |
| | | Recreational trail users | High | Substantial (see text) |
| New Metrorail bridge over W&OD Railroad Regional Park | DAAR, Dulles Toll Road, W&OD Railroad Regional Park | Motorists, transit riders | Moderate | Minimal |
| | | Recreational trail users | High | Substantial (see text) |
| **Dulles Airport Visual Assessment Unit** | | | | |
| Metrorail alignment (mostly underground, with portals east and west of the terminal, as well as ventilation outlets) | Airport roadways, terminal, parking areas, other airport uses | Motorists, transit riders | Moderate | Less than substantial (see text) |
| | | Airport workers, air travelers | High | Less than substantial (see text) |

| Physical Changes | Visibility From | Types of Viewers | Viewer Sensitivity[1] | Visual Impact[2] |
|---|---|---|---|---|
| Dulles Airport Metrorail Station (underground) | Airport roadways, terminal, parking areas, other airport uses | Motorists, transit riders, airport workers | Moderate | None |
| | | Airport workers, air travelers | High | None |
| Traction Power Substation | Airport roadways, parking areas, other airport uses | Motorists, transit riders, airport workers | Moderate | Less than substantial (see text) |
| | | Airport workers, air travelers | High | Less than substantial (see text) |
| **Dulles Greenway Visual Assessment Unit** | | | | |
| Metrorail alignment in Dulles Greenway (center median) | Dulles Greenway | Motorists and transit riders | Moderate | Minimal |
| Route 606 Metrorail Station (adjacent to Dulles Greenway) | Dulles Greenway, Dulles Transit Center | Motorists and transit riders | Moderate | Minimal |
| Route 772 Metrorail Station (adjacent to Dulles Greenway) | Dulles Greenway | Motorists and transit riders | Moderate | Minimal |
| Metrorail S&I Yard Site 7 (located North of proposed Route 606 and adjacent to Dulles Greenway) | Dulles Greenway | Motorists and transit riders | Moderate | Minimal |
| Metrorail S&I Yard Site 15 (located south of Dulles Greenway and adjacent to Route 606 to the east) | Route 606; Dulles Airport north-south runway; industrial land uses | Motorists. air travelers, airport workers, office/warehouse workers | Moderate | Minimal |
| Metrorail S&I Yard Site 20 (located south of Dulles Greenway approximately one-third mile west of Route 606) | Industrial and residential land uses | Office/warehouse workers | Moderate | Minimal |
| | | Residents | High | Potentially substantial |

1 View sensitivity levels are discussed in Section 3.4.1
2 Substantial visual impacts are those that result in deterioration in the ability to use the adjacent land as intended, a reduction in the quality of that use, obstruction of an important view, interference with a specific design in the environment, degradation of a natural condition, removal of a substantial portion or the last amount of landscaping or the natural vegetation, or similar levels of visual disturbance. Less than substantial impacts are those visual effects that would not result in these conditions. Minimal visual impacts are those that would be barely noticeable to the general public.

site and including a large retaining wall and monumentation signage that would be either obstructed from view or completely overpowered by the nearby overhead structure. This entry has been designed as a major identity feature of the development.

At the proposed Tysons East Station, common to all alignment options (with slight variations for Alignment T9 and T9 Design Option), viewers include residents in the apartments east of Scotts Crossing. These residential viewers would have a panoramic view because of their elevated position, on the hill above the station. However, by the time this station would be constructed, it is expected that ongoing development in the northwest quadrant of the Route 123/Scotts Crossing/Colshire Drive intersection would be complete and that the station would be compatible with this development. Therefore, although these residents would have a view of the station and the overhead alignment entering it, the impact would be less than substantial.

The presence of an elevated alignment and stations could cause intermittent interruption of motorists views of building signage and landmarks. The physical changes necessitated by the Tysons Central Station (Tysons Central D under the T4 Alignment) for Alignments T1, T6, T9, and T9 Design Option, the elevated station would include removal of landscaping between Route 123 and Tysons Center and partial obscuring of the entry

monument and signage for the Tysons II development. This entry monument was designed as a major identity feature of the Tysons II development and as an important way-finding landmark for the public, especially to those arriving at Tysons II by car. The loss of landscaping, which is intended to screen views of the parking structure, would be a substantial visual impact, because the parking structure and attached entrance pavilion would no longer be screened. Obscuring the entry to Tysons II would also be a substantial visual impact because of its effect on the overall design of the area and the loss of a landmark. However, development planned for the area along Route 123 and the Tysons Galleria could also change the entry.

The Tysons Central A Station, which is exclusive to Alignment T4, would be located on the south side of Westpark Drive between Westbranch Drive and Jones Branch Drive. The overhead station would require removal of street trees along Westpark Drive for the length of the station (and also for the Metrorail tracks east and west of the station). The visual impacts related to the station would be similar to those associated with Alignment T1 itself along Westpark Drive, including a dominating scale in this relatively narrow street and the removal of street trees. Although this area does not have residential viewers, these physical changes on this relatively narrow, formerly tree-lined street, would be a substantial visual intrusion to both the motorist and office worker viewers.

The Tysons Central B Station, another station exclusive to Alignment T4, would be located on the north side of Westpark Drive, spanning International Drive. If the entrance pavilion were located east of the station, it would require the removal of a small amount of vegetation from a forested area across the street from residences. The viewers at this proposed station location include motorists, office workers, and a high number of residents in the surrounding condominiums and apartments. The station would be located especially close to The Rotonda condominiums, obstructing views from the lower-level homes and outdoor recreational areas, and dominating the views from the upper-level apartments. Because of the sensitivity of these residential viewers, and the scale and proximity of the proposed station, a substantial visual impact to the residential viewers would result.

#### Mid-Corridor Visual Assessment Unit

In the Mid-Corridor visual assessment unit, the Metrorail alignment in the median of the DAAR would require the removal of stands of trees and berms. These trees and berms provide important visual relief along the DAAR. Although the majority of viewers in these units are motorists, with moderate sensitivity, the visual impact on them would be substantial because of reduced visual relief along this long, uninterrupted corridor.

Station impacts in the Mid-Corridor visual assessment unit would be similar to those for the BRT 1 stations discussed in Section 3.4.3.2, so visual impacts would be less than substantial.

In the Mid-Corridor visual assessment unit, new Metrorail bridges would be constructed over Difficult Run and the W&OD Railroad Regional Park. Difficult Run Stream Valley Park is located on either side of the DAAR and Dulles Toll Road, with an informal trail along Difficult Run connecting the two park halves through the highway right-of-way. The new bridge would block the light between the two existing bridges along this trail, creating a relatively dark "tunnel" effect. Viewers at this location are recreational trail users, who are highly sensitive to visual quality changes. Therefore, a substantial visual effect would occur.

A similar impact would occur at the W&OD Railroad Regional Park, where the additional bridges would create the same “tunnel” effect (the trail is parkland and the highways are in an easement over the park). With the same type of viewers, trail users, the visual impact would also be substantial.


Alignments T1, T4 and T6


Alignment T9

Figure 3.4-7

## Photosimulations of Elevated Metrorail Alignments along Route 7

Dulles Corridor
Rapid Transit Project

For traction power substations located on roadway shoulders, visual impacts would typically not be substantial. The Wolf Trap Foundation property in the Mid-Corridor visual assessment unit is one location where a traction power substation could result in visual impacts. This property is not part of the Wolf Trap Farm Park. However, to many observers, the Foundation's property, called the Barns at Wolf Trap, is considered to be a continuation of the park. Visual impacts here would likely carry much the same weight with the general public as those to the park itself. Planners at this early stage of the project have been working with the Wolf Trap Foundation to ensure a visually compatible siting of the traction power substation. If no appropriate site is found, substantial visual impacts could occur.

#### Dulles Airport Visual Assessment Unit

Through the Dulles Airport section, the Metrorail Alternative has been designed to ensure that there would be no impacts on the visual character of the Dulles Airport terminal. On the Dulles Airport property, siting of the eastern tunnel portal and the traction power substation is particularly critical to avoid interfering with the peekaboo view sequence of the historic terminal and other facilities. Based on the current project plans, these elements would not block any of the views of the historic features. The ultimate location would be carefully coordinated with the State Historic Preservation Office (SHPO), MWAA, and the National Capital Planning Commission (NCPC) to ensure that the views are not affected. In addition, ventilation shafts for the underground station would terminate in the parking lot north of the terminal. From the surface, these would appear as raised curbs approximately 3 feet high. As this height is lower than most automobiles, the impacts should be minimal. Thus, the underground alignment, coordinated site selection over the large amount of available airport property, and sensitive design of Metrorail facilities all would ensure that no adverse visual impacts would occur.

#### Dulles Greenway Visual Assessment Unit

Three sites—Site 7, Site 15, and Site 20—have been identified and evaluated as possible yard sites. It is expected that the track lead to service Site 20 from the Dulles Greenway can be accommodated primarily within an existing utility easement, requiring limited removal of natural forest vegetation. However, extensive removal of vegetation to accommodate either the yard site on or track lead to Site 20 could deteriorate the ability to use the adjacent land as intended and cause a reduction in the quality of that use. The result could be a substantial visual impact to the residents of a multi-family development now under construction adjacent to Site 20 to the north.

### 3.4.3.4 BRT/Metrorail Alternative

The BRT/Metrorail Alternative would be identical to the Metrorail Alternative from the eastern terminus of the Dulles Corridor to the west side of Tysons Corner. Therefore, this alternative would result in substantial visual impacts as follows:

- Impacts related to the blocking of light over the Pimmit Run Stream Valley Park due to the new Metrorail bridge creating a "tunnel" effect;
- Impacts related to the proximity of an elevated alignment (T4) to a hotel entrance and rooms and the creation of large shadow areas, potentially limiting the use of some rooms and hindering views of the entrance;
- Impacts related to the dominance of the elevated alignment (T4) on Westpark Drive and the removal of street trees, affecting highly sensitive residential viewers;
- Impacts related to obscuring or dominating the view of the shopping center entry at the intersection of Westpark Drive and Route 7 (Alignment T4 only);

- Impacts related to the removal of landscaping and exposure of a parking structure to view on the south side of Route 123 at the Tysons Central Station (called Tysons Central D under Alignment T4);
- Impacts related to obscuring the entry for Tysons II on the north side of Route 123 at Tysons Central Station (called Tysons Central D under Alignment T4);
- Impacts related to the substantial visual intrusion and removal of street trees associated with the Tysons Central A Station on the narrow tree-lined Westpark Drive; and
- Impacts related to the removal of landscaping, visual dominance, proximity, and obstruction of views for highly sensitive residential viewers at the Tysons Center B.

See Section 3.4.3.3 and Table 3.4-2 for a complete discussion of these impacts.

The BRT/Metrorail Alternative would be identical to the BRT alignment from the west side of Tysons Corner to the western terminus of the Dulles Corridor. This alternative would not result in substantial visual impacts in the Mid-Corridor, Dulles Airport, or Dulles Greenway visual assessment units. See Section 3.4.3.2 and Table 3.4-1 for a complete discussion of these impacts.

#### 3.4.3.5 Phased Implementation Alternative

Under the Phased Implementation Alternative, the final visual and aesthetic effects would be the same as those described above for the Metrorail Alternative. Interim effects would be the same as the BRT Alternative during the period when BRT operates between the Orange Line and Loudoun County. These interim effects will change to those of the Metrorail Alternative as BRT service is first replaced from the Orange Line through Tysons Corner and then between Tysons Corner and Loudoun County.

### 3.4.4 CONSTRUCTION EFFECTS

Short-term visual impacts would be related to construction and to staging areas used during construction. However, construction staging areas and techniques have not been specifically identified at this stage of project development. Therefore, the discussion of visual impacts related to construction staging areas and techniques is also not specific.

#### 3.4.4.1 Baseline Alternative

Under the Baseline Alternative, there would be no effects from the Dulles Corridor Rapid Transit Project. Construction-related visual and aesthetic effects could result from the improvements assumed as part of this alternative. Identification of these effects would be the responsibility of the agencies and jurisdictions implementing the improvements.

#### 3.4.4.2 BRT Alternative

##### Alignment BRT 1

Construction staging areas would be required for Alignment BRT 1 where new sites would be cleared for stations or the alignment, where new or rehabilitated paving would be required, where stormwater management areas would be constructed, and where maintenance yards would be built. Most construction techniques have not been identified at this time, but it is assumed that standard Best Management Practices would be used for construction.

Views into construction staging areas could occur depending upon their location. Some views could be from highly sensitive viewers. Construction staging areas often contain construction equipment, stockpiles of

materials, construction maintenance facilities, refueling stations, employee welfare facilities (including portable toilets), and parking for employee vehicles. This type of land use, though temporary, is generally not visually compatible with most surrounding development or undeveloped land, including the type of development that is most common throughout the Dulles Corridor—office, commercial, residential, recreational, and open space. In many cases, large numbers of viewers would be able to see the construction staging areas, either from high-volume roadways or from tall office and residential buildings. Thus, it is likely that at least some of the construction staging areas would result in substantial short-term visual impacts if not screened from view.

#### Alignment BRT 2

Short-term visual impacts related to construction of Alignment BRT 2 would be similar to those discussed for BRT 1. These construction-related impacts would be fewer, however, in the vicinity of the Tysons-West*Park Transit Station and Route 28, because only minor changes are proposed at Tysons-West*Park Transit Station and no construction would occur at Route 28.

#### Alignment BRT 3

Short-term visual impacts related to construction of Alignment BRT 3 would be similar to those discussed for BRT 1. However, there would be fewer construction-related visual impacts because only minor improvements are proposed at Tysons-West*Park Transit Station, Wiehle Avenue, Herndon-Monroe, and Route 28. At these locations, the improvements proposed under BRT 3 are less than those proposed under BRT 1, so construction-related visual impacts would also be of less magnitude. At Reston Parkway, the station proposed under BRT 3 is larger and much taller than under BRT 1, so construction-related visual impacts would also be greater.

### 3.4.4.3 Metrorail Alternative

Construction procedures and construction staging for the Metrorail Alternative would be different from the BRT construction for two reasons. First, the construction of Metrorail segments would involve different techniques for providing track beds than for paving new lanes. Second, the Metrorail segments would require additional elevated structures and, under some alignments, underground segments.

Short-term visual impacts related to the construction of Metrorail stations would be very similar to those discussed for BRT 1. In addition, these types of visual impacts would occur in portions of Tysons Corner.

Elevated segments would be part of the Metrorail Alternative in Tysons Corner under any alignment option. Not only do elevated segments take longer to construct, they are also more visible and harder to screen from view. Thus, elevated portions of the Metrorail Alternative have a greater chance of resulting in substantial visual impacts in Tysons Corner. The density of development in Tysons Corner and the height of many of the buildings allows for large numbers of viewers to see the construction. The visual impacts related to elevated segments would be especially severe for Alignment T4, where construction would occur very near the Courtyard by Marriott Hotel and high-rise residences with panoramic and close-up views.

Alignment T1, T6, T9, or T9 Design Option would include underground segments, requiring special construction techniques and special staging areas. Tunneling creates the removal of spoils (tunnel wastes) that must be stockpiled or hauled away and could result in visual impacts. The accumulation of dirt outside the tunnel resulting from haul trucks is particularly likely to result in visual impacts.

Underground tunnel boring operations would have tunneling activity visible only at the tunnel entrances and at stations. Cut-and-cover tunnel construction techniques, whereby a trench is dug, tunnel lining and support is

constructed from aboveground, and then the tunnel is covered, would be visible from areas surrounding the entire tunnel, not just at the entrances and stations.

#### 3.4.4.4 BRT/Metrorail Alternative

Construction-related visual impacts of the BRT/Metrorail Alternative from the eastern terminus through Tysons Corner would be the same as those discussed for the Metrorail Alternative in Section 3.4.4.3. The short-term visual impacts related to construction of the remainder of the corridor would be the same as those discussed for Alignment BRT 1 in Section 3.4.4.2. In addition, direct access ramps from the Tysons West Station to the DAAR are proposed under the BRT/Metrorail Alternative, which would result in similar short-term visual impacts.

#### 3.4.4.5 Phased Implementation Alternative

Construction of this alternative would involve the implementation of BRT and Metrorail over an extended period of time. Although the construction effects would be the same as those for the other three alternatives, the timing would be different. The effects of constructing Metrorail from the Orange Line through Tysons Corner would add to the effects of constructing BRT from the Orange Line to the terminus of the project in Loudoun County. The effects of constructing Metrorail from Tysons Corner to Loudoun County would then follow these effects. The construction related effects of the BRT and Metrorail Alternatives are described above.

Additional temporary visual impacts are anticipated related to the removal of the Spring Hill Road BRT Station (Alignment BRT 1 only) and the BRT ramps to and from the DAAR at the Tysons West Station after Metrorail is implemented.

Demolition activities have similar visual impacts to construction activities. Although some residential land uses are near these locations, most would be screened from direct views by the existing transit center and by intervening landscaping. Visual impacts related to the demolition would be less than substantial.

### 3.4.5 MITIGATION

Mitigation is recommended for substantial visual impacts. In general, however, it is recommended that the designers of the selected alternative work closely with surrounding landowners and local jurisdictions to allow the project elements to integrate well with surrounding development. The historic sensitivity of the Dulles Airport area would suggest that the designers work closely with MWAA to prevent or mitigate even less than substantial visual impacts.

#### 3.4.5.1 Baseline Alternative

No mitigation is recommended.

#### 3.4.5.2 BRT Alternative

##### Alignment BRT 1

The layover and welfare facility located in the I-66/Dulles Connector Road interchange would result in the removal of trees and berms. As mitigation, measures such as landscape screening and berms could be incorporated into the design to screen this facility.

Substantial visual impacts related to construction could occur. Available mitigation measures include screening construction and construction staging areas, keeping construction sites and staging areas clean and organized, returning the staging areas to their previous use quickly, and similar activities. These activities could all reduce construction-related visual impacts, but they cannot necessarily prevent all substantial visual impacts.

#### Alignment BRT 2

Mitigation for BRT 2 would be the same as that proposed for BRT 1.

#### Alignment BRT 3

Mitigation for BRT 3 would be the same as that proposed for BRT 1.

### 3.4.5.3 Metrorail Alternative

All mitigation available for BRT 1 is also applicable to the Metrorail Alternative, except for mitigation related to the layover and welfare facility.

For impacts related to the "tunnel" effect where the Metrorail alignment crosses the trail connecting Pimmit Run Stream Valley Park (Dulles Connector Road), the trail connecting Difficult Run Stream Valley Park (DAAR), and the W&OD Railroad Regional Park, light wells and additional lighting could be used for the safety and comfort of users.

Under any of the alignment options through Tysons Corner, landscaping would be removed on the south side of Route 123 for the south entrance pavilion for the Tysons Central Station (called Tysons Central D under Alignment T4). This would result in a substantial visual impact. Available mitigation would include the designers working with the property owner to re-establish the landscaping with replacement trees or vines if space is limited.

Under any of the alignment options through Tysons Corner, views of entry for Tysons II would be obstructed by the Tysons Central Station, resulting in a substantial visual impact. To reduce this impact, available mitigation would include project designers working with the landowner to incorporate an appropriate and visible entry into the station, or to ensure that the entry is clearly visible from both the local streets and the Metrorail. Additional development is planned at this location and the entry could be altered before the construction of the station.

Alignment T4 would place an elevated structure close to a hotel's room windows and main entrance, resulting in visual impacts that could limit the use of some rooms and the entry. Mitigation would be to move the alignment farther away from the hotel, which may not be feasible. Otherwise, the visual impact could not be mitigated.

Alignment T4 would result in the introduction of a large structure and removal of street trees along Westpark Drive. This would result in substantial visual impacts, especially to nearby residential land uses. Alignment T4 also includes two stations on this street, Tysons Central A and Tysons Central B, which would affect their surroundings. Tysons Central B would also be close to a multi-story residential property, dominating the view from some residences and blocking the view from others. Facilities related to the Tysons Central B Station would also require the removal of a substantial amount of forest vegetation in a reserved open space. These substantial visual impacts relate to the location of the alignment and station facilities, which could only be mitigated by locating the facility somewhere else.

Alignment T4 would result in the placement of a large, overhead structure near the entry associated with an office building at the northeast corner of Westpark Drive and Route 7. This would either obstruct or overpower the view of this entry, resulting in a substantial visual impact. Because the impact is related to the proximity of the structure, the only mitigation available to reduce this impact would be to relocate the alignment farther from the building.

Construction-related visual impacts would be similar to those discussed for the BRT 1 Alternative, and the type of mitigation techniques would also be similar. In addition, for Alignment T1, T6, T9, or T9 Design Option, construction-related visual impacts from tunnel construction can be even greater than for other forms of construction. Although screening techniques could prevent ground-level views of the construction staging activities, the view from upper floors of the taller buildings could not be prevented.

Construction of elevated structures would likely result in substantial visual impacts that are difficult to screen from view, especially to nearby residential viewers. Therefore, full mitigation is not likely.

The removal of stands of trees and berms in the center median of the DAAR would represent a substantial visual impact in this long corridor. Available mitigation for this impact would include landscaping in the median where possible. Due to the narrowness of the median, vines and small shrubs could be introduced in locations where trees may not be possible. The landscaping plan should not include a continuous band of vegetation, but irregular pockets of landscaping that would provide visual relief along the corridor.

Substantial visual impacts could occur as a result of locating the traction power substation at the Wolf Trap Foundation property. Depending on the siting of this facility, it may be visually incompatible. Available mitigation would include project designers working with the property owners to ensure that this facility does not result in substantial visual impacts.

#### 3.4.5.4 BRT/Metrorail Alternative

All impacts identified and mitigation techniques available for the Metrorail Alternative are also applicable to the BRT/Metrorail Alternative, except for the mitigation at Difficult Run Stream Valley Park and W&OD Railroad Regional Park, mitigation for removal of trees and berms in the median of the DAAR, and mitigation for a traction power substation at the Wolf Trap Foundation property.

Construction-related visual impacts would be similar to those discussed for the BRT and Metrorail alternatives, and the same type of mitigation techniques would apply.

#### 3.4.5.5 Phased implementation Alternative

No additional mitigation measures, other than those described above for the BRT and Metrorail alternatives are proposed.

### 3.4.6 SUMMARY OF EFFECTS

A summary of the visual and aesthetic effects discussed above is presented in Table 3.4-3.

**Table 3.4-3: Summary of Visual and Aesthetic Effects**

| Alternative | Visual Assessment Effects | | | | | Mitigation |
|---|---|---|---|---|---|---|
| | Orange Line Connection | Tysons Corner | Mid Corridor | Dulles Airport | Dulles Greenway | |
| Baseline | None | None | None | None | None | None |
| BRT 1 | 2 minimal<br>1 less than substantial | 2 minimal<br>2 less than substantial | 2 minimal<br>4 less than substantial | 3 less than substantial | 3 minimal | Designed with input from landowners, local jurisdictions, MWAA |
| BRT 2 | 2 minimal<br>1 less then substantial | 2 minimal | 4 minimal<br>2 less then substantial | 3 less then substantial | 3 minimal | Designed with input from landowners, local jurisdictions, MWAA |
| BRT 3 | 2 minimal<br>1 less then substantial | 2 minimal<br>2 less then substantial | 1 substantial, but not adverse<br>1 less then substantial<br>4 minimal | 3 less then substantial | 3 minimal | Designed with input from landowners, local jurisdictions, MWAA |
| Metrorail T1 | 3 minimal<br>1 substantial | 2 substantial<br>4 less then substantial | 3 substantial<br>4 less then substantial<br>3 minimal | 4 less then substantial | 6 minimal<br>1 potentially substantial | Designed with input from landowners, local jurisdictions, MWAA |
| Metrorail T6 | 3 minimal<br>1 substantial | 2 substantial<br>5 less then substantial | 3 substantial<br>4 less then substantial<br>3 minimal | 4 less then substantial | minimal<br>1 potentially substantial | Designed with input from landowners, local jurisdictions, MWAA |
| Metrorail T9 | 3 minimal<br>1 substantial | 2 substantial<br>5 less then substantial | 3 substantial<br>4 less then substantial<br>3 minimal | 4 less then substantial | 6 minimal;<br>1 potentially substantial | Designed with input from landowners, local jurisdictions, MWAA |
| Metrorail T4 | 3 minimal<br>1 substantial | 5 substantial<br>5 less then substantial | 3 substantial<br>4 less then substantial<br>3 minimal | 4 less then substantial | 6 minimal;<br>1 potentially substantial | Designed with input from landowners, local jurisdictions, MWAA |
| BRT/Metrorail | 3 minimal<br>1 substantial | 8 substantial<br>3 less then substantial | less then substantial<br>2 minimal | 3 less then substantial | 3 minimal | Designed with input from landowners, local jurisdictions, MWAA |
| Phased Implementation | 3 minimal<br>1 less then substantial<br>1 substantial | 2 minimal<br>2-5 less then substantial<br>2-8 substantial | 3 substantial<br>1-4 less then substantial<br>2-3 minimal<br>1 substantial but not adverse | 3-4 less then substantial | 3-6 minimal<br>1 potentially substantial | Designed with input from landowners, local jurisdictions, MWAA |

## 3.5 CULTURAL RESOURCES

This section presents information on archaeological and historic resources located within the Dulles Corridor. The discussion includes a description of regulatory requirements, methods of identifying existing historic properties, the archaeological and architectural resources identified, discussions of impacts, and potential mitigation measures.

### 3.5.1 LEGAL AND REGULATORY CONTEXT

Section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended (16 USC 470), governs federal actions that could affect historic properties. Section 106 requires federal agencies to take into account the effects of their undertakings, including licensing and approvals, on historic properties and to afford the Advisory Council on Historic Preservation and other interested parties a reasonable opportunity to comment. As defined broadly by the regulations implementing Section 106 (36 CFR 800), "historic property" means "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP) maintained by the Secretary of the Interior." Section 101(b)(4) of NEPA requires federal agencies to coordinate and plan their actions so as to preserve important historic, cultural, and natural aspects of the country's national heritage.

Section 4(f) of U.S. Department of Transportation Act, as amended (49 USC 303 (c)) states that U.S. DOT could not approve the use of land from a publicly owned park, recreation area, wildlife or waterfowl refuge, or historic site of national, State, or local significance, unless a determination is made that there is no feasible and prudent alternative to the use of that land and the action includes all possible planning to minimize harm to the property resulting from such use. Chapter 7 contains a complete discussion of sites and issues covered by this statute and its regulations.

Properties that qualify for inclusion in the NRHP must meet at least one of the following four criteria:

- Criterion A: be associated with events that have made a significant contribution to the broad patterns of our history;
- Criterion B: be associated with the lives of persons of significance in our past;
- Criterion C: embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components could lack individual distinction; or
- Criterion D: have yielded, or could be likely to yield, information important in prehistory or history (36 CFR 60.4).

Properties that qualify for the NRHP also must possess integrity, defined by the following seven aspects: location, design, setting, materials, workmanship, feeling, and association. The term "eligible for inclusion in the NRHP" includes properties formally designated as eligible and all other properties determined to meet NRHP criteria. Normally, NRHP eligibility requires a property to be at least 50 years of age. Resources less than 50 years of age that are highly significant and meet the "special criteria considerations" as outlined in the regulations (36 CFR 60.4) also may be eligible for the NRHP.

### 3.5.2 METHODOLOGY

The project team prepared a preliminary archaeological and architectural assessment of the proposed project (*Cultural Resources Technical Report*, June 2002). The report satisfies various aspects of Section 106 compliance, including documentation of archaeological and architectural resources that might be affected by the proposed project.

An integral part of the Section 106 process is the determination of the study area within which historic and archaeological resources would be affected or are likely to be affected. This Area of Potential Effects (APE) represents the "geographic area or areas within which an undertaking could directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist." To determine the boundaries of the APE, the Virginia Department of Historic Resources (VDHR) was consulted. Figure 3.5-1 shows the limits of the APE for both architecture and archaeology. The APE encompasses the area that would include all of the physical facilities and operating routes of any of the four Build Alternatives (BRT, Metrorail, BRT/Metrorail, and Phased Implementation), areas proposed for Metrorail yards, station and line facilities (e.g., parking lots, traction power substations, and tie-breakers), staging areas, or other areas of impact, and considers major built and natural features.

The APE for archaeology includes the area within the predicted limits of disturbance (LOD) for the proposed improvements where archaeological resources might be directly affected, and up to 200 feet beyond the LOD, to include secondary activities associated with construction. For historic architectural resources, the APE was expanded to 1,000 feet on either side of the centerline of the proposed alignments, or within view of the alignment, to include areas where significant or potentially significant architectural resources might be subject to noise, vibration, or visual impacts.

As discussed in Chapter 11, the project team has notified the public about the project and included the public in efforts to identify effects on historic properties throughout the preliminary engineering and environmental review phase of the project.

Preparation of this document has been conducted in accordance with appropriate federal and state regulatory guidance, including the Secretary of the Interior's Standards and Guidelines, as well as guidelines issued by VDHR. Due to the complexity of the project, a Programmatic Agreement (PA) is being established among FTA, DRPT, WMATA, ACHP, and VDHR regarding potential impacts within the APE, as well as compliance with Section 106 for the project. A copy of the draft agreement is contained in Appendix H of this Draft EIS.

### 3.5.3 EXISTING CONDITIONS

The following sections describe the process used to identify historic properties, their historic context, and the archaeological and historic architectural resources that were identified.

#### 3.5.3.1 Efforts to Identify Historic Properties

The identification of potentially affected historic properties is a critical step for compliance with both Section 106 and NEPA. Identification was conducted in accordance with the regulations implementing Section 106 and the Secretary of the Interior's "Standards and Guidelines for Archaeology and Historic Preservation."

Efforts to identify historic properties included, but were not limited to:

- Public input obtained from public scoping meetings and other public meetings conducted for NEPA compliance;
- Meetings or contact with other interested parties and agencies, including DRPT, WMATA, MWAA, and VDHR;
- Contact with individuals knowledgeable about known or potentially historic properties;
- Historic literature and map research;
- Historic context information from state and local guidelines, and secondary sources;
- Reviews of key file materials, such as the National Register of Historic Places (NRHP) and National Historic Landmark nomination forms, files and inventories for locally significant properties housed at VDHR and Fairfax County, and previous investigations (e.g., surveys and compliance-related reports); and
- Windshield survey of the APE.

Several repositories were consulted to identify known or potential historic properties and develop the historic context for the APE. Repositories visited included: the Library of Congress, VDHR, the Virginia State Library, the Virginia Room of the Fairfax County Library, the Fairfax County Planning Office, Fairfax Archaeological Services, Fairfax County Park Authority (FCPA), the Thomas Balch Library in Leesburg, and the Virginia Room of the Spotsylvania County Public Library.

#### 3.5.3.2 Historic Context

Knowledge of local prehistory and history helps to place cultural resources within their historic context. A summary of prehistoric (Native American prior to European contact) and historic (since European immigration to the Americas) development within Fairfax and Loudoun counties is provided in the *Cultural Resources Technical Report* (June 2002).

#### 3.5.3.3 Archaeological Resources

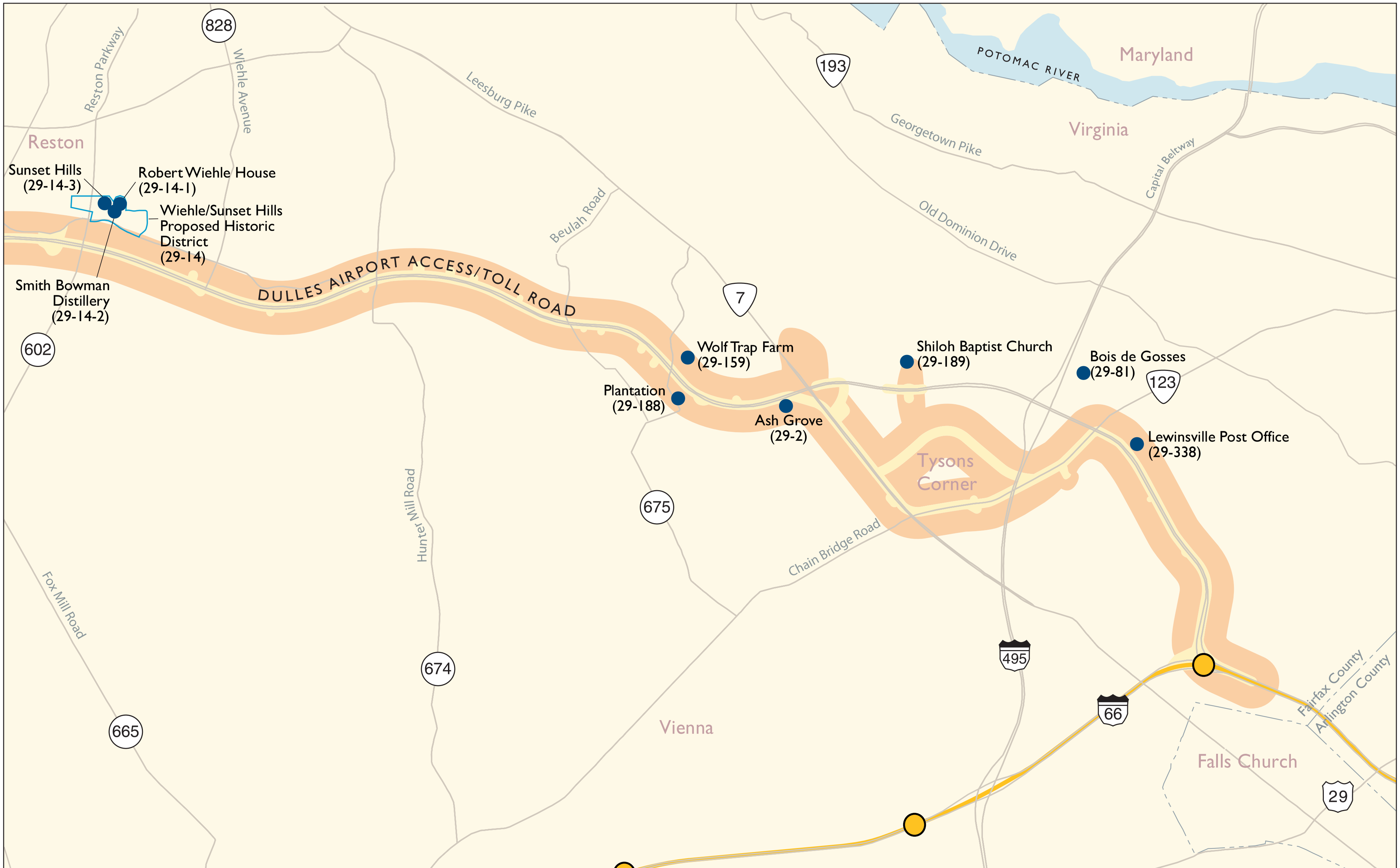
Archaeological resources are locations with evidence of past human activity. Following is a brief discussion of each of the known archaeological resources within the APE. The sites are listed in order from east to west. Actual locations of archaeological sites are kept confidential to protect the sites from disturbance and are not provided in this Draft EIS or the *Cultural Resources Technical Report* (June 2002). The description begins with the site number assigned by the SHPO, beginning with 44, the code for Virginia (the 44th state in alphabetical order). The next two letters designate the county or city (FX for Fairfax County or LD for Loudoun County). The following number is assigned in sequence as new sites are recorded with the state. In parentheses after the site number is the name given to the site by those who provided the site information to the state.

**Orange Line Connection**

**Site 44FX0388 (Olney Park/Dulles Access Connector Site).** This is an undated prehistoric site that was probably a rock quarry. The site is located within 200 feet of the LOD. The site was located in the right-of-way for the Dulles Connector Road when it was discovered in 1981. The site is probably ineligible for listing in the NRHP. No further work was recommended, and the site's importance was noted as "probably minimal" on the site form.

**Tysons Corner**

**Site 44FX2024 (Magarity Site).** This is a historic site dating to the mid-nineteenth to mid-twentieth centuries, located within 200 feet of the LOD. The site was identified in 1993 in a clearing on high ground




LEGEND

- Area of Potential Effects, Archaeology and Architecture
- Area of Potential Effects, Architecture
- Historic Architectural Resources
- Existing Metrorail Orange Line and Stations
- County Boundary
- Proposed Historic District

0 3000 6000 FEET

Figure 3.5-1a

# Historic Resources Within Area of Potential Effects

Dulles Corridor
Rapid Transit Project

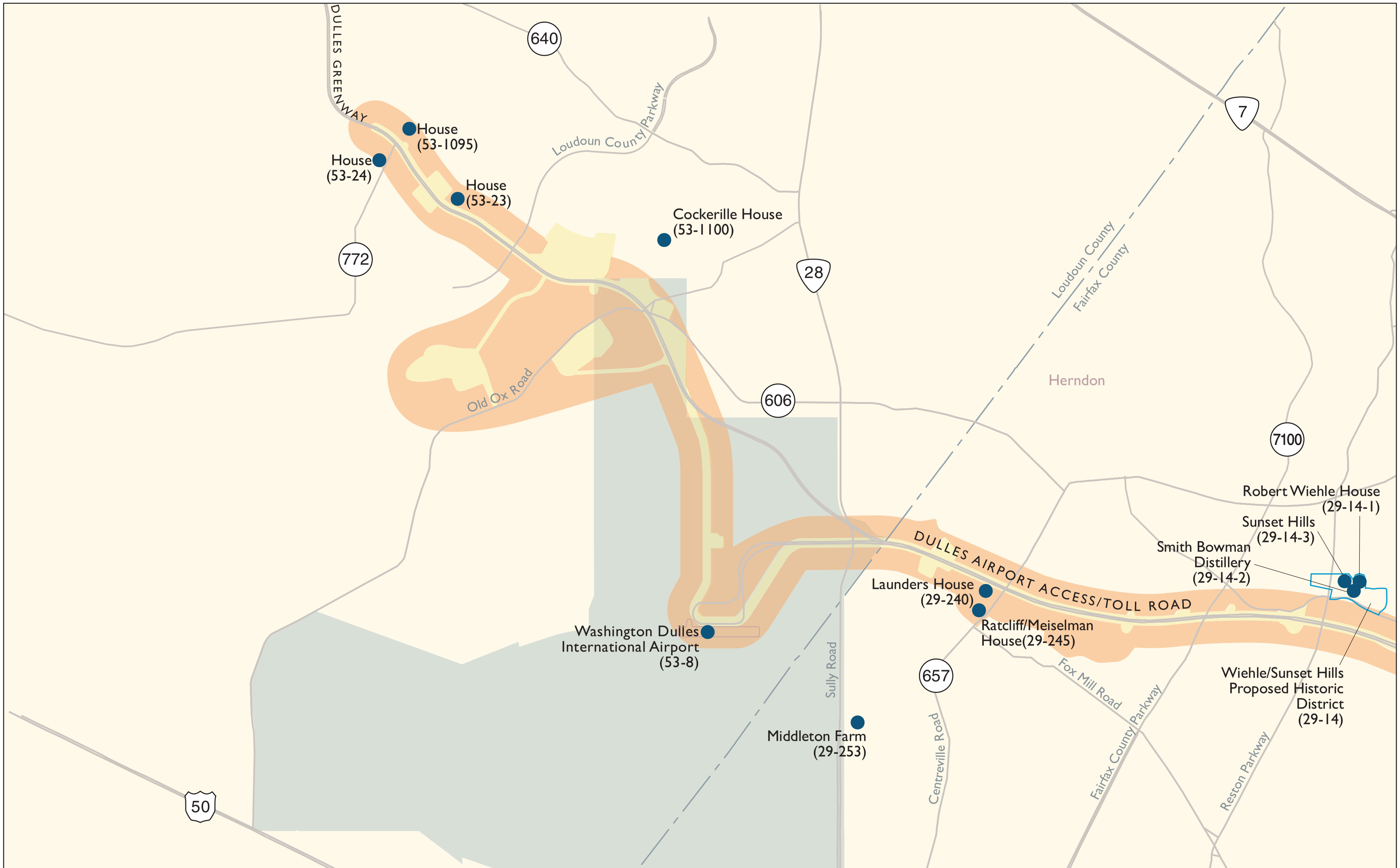



Figure 3.5-1b

**Historic Resources Within Area of Potential Effects**

where historic map research suggests a farm dwelling once stood. The occupants, shown on the nineteenth-century maps of the site area, were the Magarity family. It was recommended that further testing be conducted in the clearing and the surrounding woods. The site is on land that has been graded and developed commercially in 2001 and likely has been destroyed. The site is probably ineligible for listing in the NRHP.

**Site 44FX0051 (Maplewood).** This historic site is located within 200 feet of the LOD, and is associated with the historic house Maplewood that once stood at this location. Maplewood (County Architectural No. 29-4-A1 [#32]) was built in 1870 and was demolished in 1970. The French Second Empire-style residence was unusual for Fairfax County. Prior to its demolition, the house was used as a corporate office building; attempts to save the house by moving it to another location proved unfeasible. After demolition of Maplewood, an office building was constructed. It is unknown if archaeological features remain. Current plans call for the area to be redeveloped for commercial purposes. Although Maplewood has an archaeological site number, it does not appear that any archaeological investigation has been conducted at the site. The site was one of the earliest recorded in the county and the number appears to have been assigned due to the presence of the historic house. The site probably is ineligible for listing in the NRHP.

### Mid-Corridor

**Site 44FX2299 (Jarrett #4).** This is a prehistoric site consisting of a camp of unknown date located within 200 feet of the LOD. The site was identified by observing exposed and weathered surfaces in a wooded area. It was thought that the site soils probably were eroded. It is probable that most of the site was destroyed by construction of the Dulles Toll Road. Phase II (subsurface) testing was recommended before development. It is possible that remaining portions of the site are potentially eligible for the NRHP.

**Site 44FX1569 (Dulles Toll Road Site).** This prehistoric site may have been a stone quarry. The site, located within 200 feet of the LOD, was surveyed by Fairfax County personnel in 1989 and underwent Phase II testing that same year (Otter et al. 1989). The site was potentially eligible for the NRHP, and Phase III (data recovery) excavations were recommended prior to construction. No record of Phase III excavations was found. The site is potentially eligible for the NRHP.

**Site 44FX2034 (Reston Land Parcel 912 A&B).** This historic site is dated to the 20th and possibly as early as the late 19th century. The site, located within 200 feet of the LOD, consisted of foundations from a complex of farm buildings that were demolished in the 1980s. The former farmhouse (State No. 16-4-A1) may have been built about 1905. The farm was abandoned and the area was slated for development in 1993. However, as of October 2001, the site has not yet been developed. No further work at the site was recommended. This site probably is ineligible for the NRHP.

**Site 44FX1489 (Worldgate Hotel Site)**. This prehistoric and historic site is located within 200 feet of the LOD. The site was discovered in 1988 from surface manifestations after bulldozing. Subsequently, the site was plowed and Phase II testing was conducted that same year (Johnson Letter Report 1988). Artifacts were recovered dating to a variety of time periods, including 7000 BC, 3000 BC, 2000 BC, and the late nineteenth century. Much of the site has been destroyed by development. The site probably is ineligible for the NRHP.

**Site 44FX0232.** This is a prehistoric site of unknown date discovered in 1980 and located within 200 feet of the LOD. By 1994, a man-made lake occupied part of the site (USGS 1994 Herndon), leading to the conclusion that at least part of the site has been destroyed. The site probably is ineligible for the NRHP.

**Site 44FX0915 (Arrowhead Farm).** This historic site is located within 200 feet of the LOD and dates from the twentieth century. In 1985, a surface scatter of artifacts was found which was thought to be associated with the house standing on the property (the Launders House, about 1910, County No. 16-3-A6). However, the assemblage may have been debris thrown into the area from Horsepen Road and, therefore, of indefinite association. The site probably is ineligible for the NRHP.

**Site 44FX2233 (Dulles Green/DG 2).** This historic site dates to about 1875 to 1900. A domestic complex was depicted at this location on historic maps. The site, located within 200 feet of the LOD, was rediscovered during a Phase I survey in 1997. The area was an abandoned overgrown field slated for development. Surface deposits were present, but subsurface integrity has been compromised by grading and filling. No further work was recommended. The location does not appear to have been developed. The site probably is ineligible for the NRHP.

### Dulles Airport

**Site 44LD0500 (Trueno).** This prehistoric site from the Archaic Period was discovered in an open field in 1991 (Simmons and Kassner 1991). The site is within 200 feet of the LOD. The site was on level ground that had been graded and contoured. No further work was recommended for the site. The site has been developed as part of car rental facilities. The site probably is ineligible for the NRHP.

**Site 44LD0491 (HE-696A "Orange").** This prehistoric site, located within 200 feet of the LOD, was discovered in a cleared field south of a commercial plant in 1991. The site could have been disturbed by construction of the Dulles Greenway and/or land contouring for stormwater control for a nearby industrial park. The site probably is ineligible the NRHP.

**Site 44LD0379 (HNWE-1A or Indian Creek Site).** This prehistoric site, situated in the 100-year floodplain of Indian Creek, dates to the Early (approximately 7500 – 5000 BC) and possibly Middle Archaic (5000 – 3000 BC) Periods. It is located within 200 feet of the LOD. The site was identified in 1987 during a survey for the proposed extension of the Dulles Toll Road and further testing was recommended. Phase II testing was conducted in 1988 (Haynes 1990). The site was found to contain intact features, including post molds and areas of burned and compacted soil (possible hearths). Phase III excavation was recommended. The site could have been partially destroyed by construction of the Dulles Greenway in the mid-1990s. Some of the site could have been avoided during construction. Portions of the site that may remain are potentially eligible for the NRHP.

**Site 44LD0432 (Runway #1).** This prehistoric site of unknown date is located within 200 feet of the LOD. Discovered in 1988, the site was within a newly planted pine forest and a grassy area. No further testing was recommended, and the site probably is ineligible for listing in the NRHP.

### Loudoun County

**Site 44LD0380 (HNWF-1A).** This site has both prehistoric and historic components located within 200 feet of the LOD. The date of the prehistoric component is unknown; the historic portion dates to the early twentieth century. The site was discovered in a pine plantation in 1987 during a survey for the proposed extension of the Dulles Toll Road (Haynes 1988). At that time there had been moderate to heavy disturbance to the area from the creation of logging roads. No further work was recommended because the area of the site to be affected was sparse and disturbed. The site probably has been further disturbed by the creation of a Dulles Greenway interchange and probably is ineligible for the NRHP.

**Site 44LD0408 (HSP-789A).** This prehistoric site of unknown date, within 200 feet of the LOD, was identified in a cultivated field in 1988. Further survey and testing were recommended and Phase II testing was conducted in 1988 (Haynes 1990). The site was judged not to contain data sources of significant value, and no further work was recommended. The site is within pastureland on an active farm in 2002, and probably is ineligible for listing in the NRHP.

**Site 44LD0383 (HSEE-BR).** This prehistoric site of unknown date, located within the LOD, was discovered in 1987. The environment was in brush, in a formerly cultivated field on a floodplain. Further testing was recommended and Phase II testing was conducted in 1988 (Haynes 1990). The site was judged not to contain data sources of significant value, and no further work was recommended. The site may have been destroyed by construction of the Dulles Greenway and probably is ineligible for listing in the NRHP.

**Site 44LD0472 (HE-P620A).** This prehistoric site of unknown date is located within 200 feet of the LOD. The site was discovered in 1990, and Phase II testing was recommended. The site may have been partially disturbed by construction of the Dulles Greenway. However, undisturbed portions, if present, may potentially be eligible for the NRHP.

**Site 44LD0377 (HNWB-1A).** This prehistoric site of unknown date was discovered on a sod farm in 1987. Because the site was so sparse, no further work was recommended. The site, located within 200 feet of the LOD, appears to be within a tract currently undergoing development. The site probably is ineligible for the NRHP.

**Site 44LD0378 (HNWB-1B).** This is a site with both prehistoric and historic components located within the LOD. The site was discovered and surface collection of artifacts was done in 1987. The prehistoric component is undated and the historic artifacts were dated to the nineteenth century. No further work was recommended because the site was sparse for its size, and nothing especially notable was present in the artifact assemblage. The site probably has been destroyed by construction of the Dulles Greenway and recent commercial development. The site probably is ineligible for the NRHP.

### 3.5.3.4 Historic Architectural Resources

Generally, historic architectural resources are buildings, structures, landscapes, or objects greater than 50 years of age. The following is a brief discussion of each of the known architectural resources within the APE. Locations of the known architectural resources within the APE are shown in Figure 3.5-1.

#### Orange Line Connection

**The Lewinsville Post Office (State No. 29-338) 1554 Great Falls Road, McLean.** The Lewinsville Post Office is a two-story, front-gabled, wood-frame building with a one-story front porch located over 200 feet from the LOD. Constructed in the 1850s, it served as the Lewinsville Post Office from 1857 to 1911. The post office and general store occupied the large room on the first floor. In 1980, the building was moved several hundred feet from its original location for the widening of Chain Bridge Road (Route 123). The building's interior and exterior retain a high degree of historic integrity. The resource was placed on the Fairfax County Historic Landmarks Inventory in 1981. A Preliminary Information Form (PIF) was submitted to the Virginia Division of Historic Landmarks in 1986 for preliminary consideration for the Virginia Landmarks Register and the NRHP. Based on the information submitted, the State Review Board found on October 14, 1986, that the building was not eligible for the NRHP or the Virginia Landmarks Register. The Board stated that the property could be reconsidered, however, if the applicants could show that the Lewinsville Post Office

best represented the Town of Lewinsville as the focus of nineteenth-century social life and was the best surviving building from that century. No further information appears to have been submitted.

### Tysons Corner

**Bois de Gosses (29-81) 1358 Windy Hill Road, McLean.** This two-story dwelling, located over 200 feet from the LOD, consists of a series of additions built around an original four-room, hewn-log core. The log portion of the house was possibly built as early as 1800. The house was expanded before 1869 and again in 1954. It now has a full-length, two-story front porch and brick exterior end chimneys. The dwelling reportedly served as a field hospital during the Civil War. Historically, it was also known as Windy Hill Farm and Hill Farm. The property was entered on the Fairfax County Historic Landmarks Inventory in 1971. It is not listed in the Virginia Landmarks Register or the NRHP, though it is potentially eligible for the latter.

**Shiloh Baptist Church (29-189) 1331 Spring Hill Road, McLean.** This one-story, wood-frame church, located over 200 feet from the LOD, features a simple elongated nave plan typical to late-nineteenth and early twentieth-century rural churches. Each side elevation has four gothic-arched, stained glass windows. Although the congregation was formed in 1873, this building was erected in the 1920s after the original church burned. With the Pleasant Grove Methodist Church, Shiloh Baptist Church is one of two churches serving Odricks, a community formed in the 1870s by African Americans. The property was entered on the Fairfax County Historic Landmarks Inventory in 1972. It is not listed on the Virginia Landmarks Register or the NRHP, but it is potentially eligible for the latter.

### Mid-Corridor

**Ash Grove (29-2), 8900 Ash Grove Lane, Vienna.** This property consists of a rebuilt eighteenth-century dwelling with two historic outbuildings and is located over 200 feet from the LOD. The two-and-one-half-story clapboard house features three gabled dormers, brick interior end chimneys, and a rear wing. Its original core was reportedly built by the Fairfax family as early as 1790. In 1850, Captain Henry Fairfax sold the property to James Sherman and it remained in the Sherman family through five generations. To preserve the house from condemnation, the alignment of the Dulles Airport Access Road was altered. In 1960, the house was documented with measured drawings and photographs, in accordance with the Historic American Buildings Survey (HABS) standards. During a subsequent restoration effort in September 1960, most of the main house burned. Original doors, windows, and interior woodwork, which had been removed for restoration, were reused when the house was rebuilt with the guidance of the HABS drawings and photographs. Within the past decade, a developer purchased the property for construction of the Tysons Village townhouse complex. As part of the development, the developer proffered the site to the Fairfax County Park Authority. The Park Authority acquired the 12 acres of the site containing the house, the detached brick kitchen, and the wood-frame smokehouse. The Sherman and Fairfax family cemetery was relocated prior to construction of the townhouse development. The property is not listed on the Virginia Landmarks Register or in the NRHP, but is potentially eligible for the latter.

**Wolf Trap Farm (29-159) 1551 and 1555 Trap Road, Vienna.** Presently owned by the National Park Service (NPS), the Wolf Trap Farm Park is a 130-acre complex consisting of an historic farm developed in the twentieth century as the country's only national park for the performing arts. The site is located more than 200 feet from the LOD. The resources on this property include the original Wolf Trap Farm, the Filene Center auditorium, and its associated outbuildings. The associated Barns of Wolf Trap, which are also used for performances, are located near Plantation (see below).

The historic farmhouse on the property, Wolf Trap Farm, is a one-and-one-half-story dwelling with hewn-log core and lean-to that possibly date to the eighteenth century. The house was expanded in the nineteenth and twentieth centuries with one- and two-story additions on the north side, a dormer on the east slope of the original cabin roof, and a kitchen on the south side. The farm property is reportedly associated with local events during the Civil War. Prominent Washingtonians Jouett and Catherine Filene Shouse used the farm in the 1930s and 1940s as a country retreat. In 1944, the United Kingdom delegation gathered here for preliminary talks preceding the Dumbarton Oaks Conference on International Organization, which led to the creation of the United Nations. The Shouses donated the farm to NPS to create the Filene Center for the Performing Arts.

The Filene Center is a modern performing arts complex built on the grounds of the historic Wolf Trap Farm. The current wood and steel auditorium was built in 1984 after fire destroyed the original 1971 building.

In 1972, the Wolf Trap Farm property was entered on the Fairfax County Historic Landmarks Inventory, and the Filene Center was added to this list in 1977. VDHR files include correspondence that records efforts to create a cultural district around the property to control adjacent development. NPS completed a NRHP Inventory Nomination Form for the historic farmhouse in 1974, but the property was not formally listed in the NRHP.

**Plantation (29-188) 1624 Trap Road, Vienna.** Plantation is a two-story brick and frame dwelling with extensive alterations and numerous outbuildings located more than 200 feet from the LOD. It was built around 1895 as a vernacular cross-gabled dwelling. Part of the Wolf Trap Farm parcel (see above), Plantation was renovated in the 1960s by Catherine Filene Shouse, the donor of Wolf Trap Farm Park and the Filene Center for the Performing Arts. This site was entered on the Fairfax County Historic Landmarks Inventory in 1971. It is not listed on the Virginia Landmarks Register or in the NRHP but is potentially eligible for the latter.

Now the property is used as offices for Wolf Trap Farm Park and includes a variety of historic and modern buildings. These include frame sheds, a barn, and stables, as well as a greenhouse, two prefabricated mobile homes, and a modern log cabin. Near the complex are two eighteenth-century barns that were moved from out-of-state locations and reassembled on the site. Known as The Barns of Wolf Trap, these buildings are used for informal performances.

**Robert Wiehle House (29-14-1) 1830 Old Reston Avenue, Reston.** This two-story frame dwelling, located more than 200 feet from the LOD, has a center gable and a one-story front porch. Built around 1890, it retains much of its original ornamental Carpenter Gothic woodwork. It was built for Robert Wiehle and is one of only three buildings that remain of the town of Wiehle. In the 1880s, Wiehle's uncle, Dr. Carl Adolph "Max" Wiehle, purchased a large tract of land here and planned a self-sufficient town. The building now sits in the midst of Reston, a modern mixed-use community designed and developed in the 1950s and 1960s by Robert E. Simon. A partial PIF was submitted to the Virginia Division of Historic Landmarks in 1992 for preliminary consideration of the house for the Virginia Landmarks Register and the NRHP, but the property has not been listed on these registers.

**Smith Bowman Distillery (29-14-2) 1875 Old Reston Avenue, Reston.** This simple two-story, front-gabled, brick building, built in 1892 as the town hall for Wiehle, Virginia, is more than 200 feet from the LOD. The Wiehle Methodist Episcopal Church used its second floor for church services. The building was the social center for a town founded by Dr. Carl Adolph "Max" Wiehle. He laid out a street plan and envisioned

developing a self-supporting community of up to 4,000 residents. The community failed to grow, however, and after Wiehle's death, Dr. Hutchinson bought much of the land. He occupied the Wiehle Mansion, (see Sunset Hills 29-14-3) and the old town hall was converted to a residence. Later, the building was incorporated into the 7,200-acre Sunset Hills Farm, owned by A. Smith Bowman. In 1934, Bowman established a whiskey distillery on the farm. The old town hall was altered to accommodate distilling vats and stills for the production of Virginia Gentleman and Fairfax County brands of whiskey. It is now the only building remaining from the factory. The building now sits in the midst of modern Reston.

Because it is a significant architectural example of an early town hall, and because of its association with locally significant persons—Wiehle and Bowman—and significant historical events, it was determined eligible for the NRHP under Criteria A, B, and C. It was listed in the NRHP and the Virginia Historic Landmarks Register in 1999.

**Sunset Hills (29-14-3) 1850 Reston Avenue, Reston.** Sunset Hills is a symmetrical two-and one-half story brick dwelling dominated by a central covered carriageway. Washington, D.C., architect Erskin Sunderland designed the house, which was built in 1899. It is located in the midst of modern Reston, more than 200 feet from the LOD. The house was originally known as the Wiehle Mansion. Its first owner, Dr. Carl Adolph "Max" Wiehle, had founded the surrounding town of Wiehle several years earlier. By the 1920s it was occupied by A. Smith Bowman, who accumulated 7,200 acres of adjacent farmland. Bowman was a horseman from Kentucky, and his large farm became the center of the Fairfax Hunt. After the 1934 repeal of prohibition, Bowman established Virginia's only legal whiskey distillery on the land (see above). The Historic Preservation Planner of Fairfax County completed a NRHP Inventory Nomination Form for the property in 1978, but the Virginia Historic Landmarks Commission concluded that the dwelling was not eligible for listing. The building is now called the DeMoss House, and it is part of a complex owned by Prison Fellowship Ministries.

**Wiehle/Sunset Hills Proposed Historic District (29-14) Reston.** In 1987, the Fairfax County Historic Preservation Officer submitted a PIF to the Virginia Division of Historic Landmarks for preliminary consideration of the Wiehle/Sunset Hills Historic District for listing on the Virginia Landmarks Register and the NRHP. The approximately 16-acre district, located more than 200 feet from the LOD, was to include the Robert Wiehle House, Sunset Hills, and the Smith Bowman Distillery (see above). The boundaries of the proposed historic district are shown in Figure 3.5-1b. The boundary is divided into two sections by Old Reston Avenue (State Route 5734). To the west of Old Reston Avenue, the southern boundary is The W&OD Railroad Regional Park and the western edge is roughly 400 feet west of Old Reston Avenue. The northern boundary is approximately 500 feet north of the W&OD Trail. To the east of Old Reston Avenue, the southern boundary is #4 Outlet Road and Lakeside Avenue, along the north edge of county parcel No. 5A. The northern boundary veers northward to incorporate county parcel No. 3, which contains the Robert Wiehle House. The eastern boundary is the eastern edge of county parcel No. 5A, approximately 1,500 feet east of Old Reston Avenue. Included within this boundary, but not mentioned in the documentation, is the Sunset Hills Railroad Station of the Washington and Old Dominion Railroad. This small, wood-frame building was built as a passenger station between 1912 and 1915 and is currently owned by the Northern Virginia Regional Park Authority (McCray 2001). The resource is not listed in the NRHP or the Virginia Landmarks Register. In 1987, Virginia Delegate Kenneth R. Plum (36th District) supported efforts to create a scenic byway along the segment of Route 5734 (Old Reston Avenue) that runs through this area. Correspondence on file at the VDHR indicates that in 1987 the agency concurred with VDOT that Route 5734, Old Reston Avenue did not qualify as a Virginia Scenic Byway.

**Launders House (29-240) 2300 Centreville Road, Herndon.** This two-story frame dwelling was built around 1910 near the community of Floris and is within 200 feet of the LOD. It is clad in weatherboard siding and sits on a concrete foundation. As was typical to the I-house plan, the house is three bays wide and has a side-gable roof. It also features a two-story full front porch. It was surveyed as part of the Fairfax County Historic Resources Management Plan (HRMP) in 1985. The resource is not listed on the Virginia Landmarks Register or in the NRHP, though it is potentially eligible for the latter.

**Ratcliff/Meiselman House (29-245) 2346 Centreville Road, Herndon.** This farm house near the Floris community, located more than 200 feet from the LOD, is significant for its association with the Civil War. Laura Ratcliff, the wartime occupant of the property, was a close friend of Confederate Colonel John Singleton Mosby. Mosby gained local prominence during the Civil War for harassing Union troops traversing the region throughout the conflict. The house figured prominently in Mosby's wartime activities. He is said to have received his officer's commission in its living room. Additionally, the wood-frame house has architectural significance, with an original core dating to the late-eighteenth century. The property is listed on the Fairfax County Historic Landmarks Inventory and it was surveyed as part of the HRMP in 1985. Although no determination has been made about its eligibility for the NRHP or the Virginia Landmarks Register, the HRMP recommended that the property be evaluated for possible individual listing in the NRHP.

**Middleton Farm (29-253) 13801 Frying Pan Road, Herndon.** This extensive dairy farmhouse, located more than 200 feet from the LOD, includes 23 buildings and 4 structures and has been cited as an excellent example of a surviving dairy farm in Fairfax County. The two-story brick farmhouse, built in 1912, has elements of a typical American Foursquare dwelling. It features a large one-story front porch and cast-concrete sills and lintels that would have been considered modern materials at the time. The property also includes a frame dwelling that could date to the 1850s. Other buildings and structures on the property include two dairy barn complexes, numerous sheds, a silo, and a well house. The farm was surveyed in 1985 as part of the HRMP. The HRMP described the farm as the most important example of the agricultural and dairying history of the county. It identified the oldest barn as one of only two late-nineteenth-century barns remaining in the western part of the county. The 1928 dairy barn was cited as an excellent remaining example of its type. The 1912 dwelling was described as "perhaps the most intact house of that era in all of Fairfax County." Although no determination has been made about its eligibility for the NRHP or the Virginia Landmarks Register, the HRMP recommended that the property be evaluated for possible individual listing in the NRHP.

### Dulles Airport

**Washington Dulles International Airport (53-8).** Begun in 1958, Dulles Airport encompasses approximately 11,000 acres in Fairfax and Loudoun counties and was the first airport in the world designed exclusively for jet travel. Renowned Finnish-born American architect Eero Saarinen stated that he considered the concrete, steel, and glass Main Terminal, which dominates the property, as his finest achievement. Described by Saarinen as a "huge continuous hammock suspended between concrete trees," this unique building exemplifies the architect's efforts to combine architecture and sculpture using new technologies and materials. The roadway approach to the airport was designed to allow motorists to gradually view the architecture. As motorists approach the airport from the east, they encounter a sequence of views of the tower and terminal building known as the "peekaboo sequence." Saarinen won the Gold Medal Award from the American Institute of Architects posthumously in 1962 for his groundbreaking design.

In the 1970s, the Advisory Council on Historic Preservation, the Virginia Historic Landmarks Commission, and the American Institute of Architects registered concerns about proposed alterations to the significant property.

In 1977, the Keeper of the NRHP asked the Department of Transportation (U.S. DOT) to nominate the property to the NRHP. U.S. DOT then requested a determination of eligibility from the NRHP, which was made in 1978. Although the property was determined eligible under Criteria A, B, and C, it was never formally listed.

A 1989 historic architectural survey of the property identified 13 of the approximate 62 buildings at the airport as contributing buildings to an historic district associated with the Main Terminal. The proposed district encompasses the integral parts of Saarinen's original intent and is within 200 feet of the LOD. Contributing buildings include the Main Terminal and control tower, a group of four maintenance and support facility buildings to the west of the terminal, the group of four service buildings east of the terminal, and two apron buildings, specifically the Apron Tower and the Triturator Building. The 18 original mobile lounges were identified as historic structures. Terminal area landscaping and the approach road were identified as contributing landscape elements associated with the main terminal.

Modifications to the airport have taken place over the years. Passenger waiting areas were added on the south side of the Main Terminal in the 1970s (Skidmore, Owings & Merrill 1990). Temporary aircraft boarding-gate facilities were added at the base of the Tower in the mid-1980s, as well as temporary mid-field buildings at the remote jet apron. A new Master Plan for Dulles Airport was completed in 1985 by Peat Marwick. Proposed changes included a midfield concourse linked to the Main Terminal by an underground people mover system and the expansion of the Main Terminal to 1,240 feet. Skidmore, Owings & Merrill updated the Master Plan in 1986, adding a proposed International Arrivals Building in the midfield area.

### Loudoun County

**Cockerille House (53-1100) Route 789, Sterling vicinity.** This two-story, wood-frame farmhouse, probably built in the early twentieth century, is more than 200 feet from the LOD. It is an example of a hall-and-parlor plan farmhouse and has a side-gable, standing- seam metal roof. It has been expanded with several one-story additions. Its outbuildings include three wood frame and concrete block barns and nine other miscellaneous farm buildings. No determination has been made about its eligibility for the NRHP or the Virginia Landmarks Register. However, an informal evaluation of the house was made in conjunction with a cultural resources study prior to the construction of the Postal Service facilities near the farm (Haynes 1989). The opinion expressed in this study was that the original section of the house appeared to date around the early twentieth century with the additions appended at varying times afterward.

**House, Route 643 (53-23), Ryan.** This two-story, wood-frame farmhouse with a side-gable, standing-seam metal roof is an example of a typical I-house and probably dates to the late-nineteenth century. It has been covered with stucco and has a shed-roofed front porch. The property, located more than 200 feet from the LOD, also includes several small concrete block sheds, barns, and a silo. The dwelling was surveyed in 1988 (Haynes 1988). It is presently abandoned and deteriorating. The house is not listed on the Virginia Landmarks Register or in the NRHP, but is potentially eligible for the latter.

**House, Route 772 (now Petworth Court; 53-1095), Ryan.** This two-story, wood-frame dwelling is two bays wide and exhibits the common vernacular hall-and-parlor plan with a rear extension. It is located more than 200 feet from the LOD. It was probably built in the early twentieth century. The shed-roofed front porch has been recently enclosed. The property also includes a shed. The recent realignment of Route 772 across the Dulles Greenway has moved Route 772 southward. This house's street is no longer Route 772; the

street has been shortened into a cul-de-sac and is now known as Petworth Court. This resource is not listed on the Virginia Landmarks Register or the NRHP, but is potentially eligible for the latter.

**House, Route 772 (53-24), Ryan.** This two-story wood frame dwelling, located over 200 feet from the LOD, exhibits the common vernacular hall-and-parlor plan. It probably was built in the late-nineteenth or early-twentieth century. It features a shed-roofed front porch. The property also includes a modern garage. The dwelling was surveyed in 1988. The house was described as being a very common type, and "further documentation should not be necessary" (Haynes 1988:111). The house is not listed on the Virginia Landmarks Register or in the NRHP, but it is potentially eligible for the latter.

### 3.5.4 LONG-TERM EFFECTS

As defined in Section 106 of the NHPA, an effect on a cultural resource could occur due to an action that could 1) physically damage or destroy all or part of the property; 2) isolate the property or alter the character of the property's setting, when that character contributes to the property's qualification for the NRHP; 3) introduce visual, audible, or atmospheric elements that are out of character with the property or alter its setting; 4) result in neglect of a property leading to its deterioration or destruction; or 5) result in the transfer, lease, or sale of the property without adequate restriction or conditions included to ensure preservation of the property's significant historic features.

The long-term effects of the various alternatives of the Dulles Corridor Rapid Transit Project on cultural resources would be direct or indirect. Direct effects could be from actual physical contact with the resources. Indirect effects would be from noise and visual impacts. These indirect impacts are more likely to affect historic architectural resources than archaeological sites. Exceptions include archaeological sites that are open to the public for visitation, such as those located at historic house museums or battlefield parks. The noise impacts at the identified historic architectural resources within the APE were assessed in accordance with applicable noise criteria. Potential impacts on historic architectural resources were assessed using FTA and WMATA criteria for noise. Vibration levels at the historic resources were judged to be below FTA criteria for annoyance and well below the threshold for minor cosmetic damage.

Table 3.5-1 summarizes the project's effects on archaeological resources, while Table 3.5.2 summarizes the project's effect on historic architectural resources.

#### 3.5.4.1 Baseline Alternative

Under the Baseline Alternative, there would be no potential for effects resulting from the Dulles Corridor Rapid Transit Project. However, there could be adverse effects from the improvements assumed under this alternative. Identification of these adverse effects would be the responsibility of the agencies and jurisdictions implementing the improvements.

#### 3.5.4.2 BRT Alternative

The BRT Alternative would have minor impacts to several historic architectural resources, as discussed below.

**Table 3.5-1: Project Effects on Archaeological Resources**

| Resource | Baseline Alternative | BRT Alternative | Metrorail Alternative | BRT/Metrorail Alternative | Phased Implementation |
|---|---|---|---|---|---|
| **Orange Line Connection** | | | | | |
| Site 44FX0388 Olney Park/Dulles Access Connector Site | No Potential to Cause Effects | No Historic Properties Affected | Construction of nearby tie-breaker station has potential of disturbing site (Potential adverse effect) | Construction of nearby tie-breaker station has potential of disturbing site (Potential adverse effect) | Construction of nearby tie-breaker station has potential of disturbing site (Potential adverse effect) |
| **Tysons Corner** | | | | | |
| Site 44FX2024 Magarity Site | No Potential to Cause Effects | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected |
| Site 44FX0051 Maplewood | No Potential to Cause Effects | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected |
| **Mid-Corridor** | | | | | |
| Site 44FX2299 Jarrett #4 | No Potential to Cause Effects | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected |
| Site 44FX1569 Dulles Toll Road Site | No Potential to Cause Effects | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected |
| Site 44FX2034 Reston Land Parcel 912 A&B | No Potential to Cause Effect | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected |
| Site 44FX1489 Worldgate Hotel site | No Potential to Cause Effects | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected |
| Site 44FX0232 | No Potential to Cause Effects | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected |
| Site 44FX0915 Arrowhead Farm | No Potential to Cause Effects | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected |
| Site 44FX2233 Dulles Green/DG2 | No Potential to Cause Effects | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected |
| **Dulles Airport** | | | | | |
| Site 44LD0500 Trueno | No Potential to Cause Effects | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected |
| Site 44LD0491 "Orange" | No Potential to Cause Effects | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected |
| Site 44LD0379 Indian Creek Site | No Potential to Cause Effects | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected |
| Site 44LD0405 | No Potential to Cause Effects | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected |
| **Loudoun County** | | | | | |
| Site 44LD0380 | No Potential to Cause Effects | No Historic Properties Affected | If any resources remain, site could be destroyed by construction of Route 606 Station facilities or staging areas (Potential adverse effect) | No Historic Properties Affected | If any resources remain, site could be destroyed by construction of Route 606 Station facilities or staging areas (Potential adverse effect) |
| Site 44LD0408 | No Potential to Cause Effects | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected |

| Resource | Baseline Alternative | BRT Alternative | Metrorail Alternative | BRT/Metrorail Alternative | Phased Implementation |
|---|---|---|---|---|---|
| Site 44LD0383 | No Potential to Cause Effects | No Historic Properties Affected | If any resources remain, site could be destroyed by construction of Metrorail alignment (Potential adverse effect) | No Historic Properties Affected | If any resources remain, site could be destroyed by construction of Metrorail alignment (Potential adverse effect) |
| Site 44LD0472 | No Potential to Cause Effects | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected |
| Site 44LD0377 | No Potential to Cause Effects | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected |
| Site 44LD0378 | No Potential to Cause Effects | No Historic Properties Affected | If any resources remain, site could be destroyed by construction of Metrorail alignment (Potential adverse effect) | No Historic Properties Affected | If any resources remain, site could be destroyed by construction of Metrorail alignment (Potential adverse effect) |

**Table 3.5-2: Project Effects on Architectural Resources**

| Resource | Baseline Alternative | BRT Alternative | Metrorail Alternative | BRT/Metrorail Alternative | Phased Implementation |
|---|---|---|---|---|---|
| **Orange Line Connection** | | | | | |
| Lewinsville Post Office (29-338) | No Potential to Cause Effects | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected |
| Tysons Corner | | | | | |
| Bois de Gosses (29-81) | No Potential to Cause Effects | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected |
| Shiloh Baptist Church (29-189) | No Potential to Cause Effects | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected |
| **Mid-Corridor** | | | | | |
| Ash Grove (29-2) | No Potential to Cause Effects | No Historic Properties Affected | No Adverse Effect | No Historic Properties Affected | No Adverse Effect |
| Wolf Trap Farm (20-159) | No Potential to Cause Effects | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected |
| Plantation 1624 Trap Road (29-188) | No Potential to Cause Effects | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected |
| Robert Wiehle House (29-14-1) | No Potential to Cause Effects | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected |
| Smith Bowman Distillery (29-14-2) | No Potential to Cause Effects | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected |
| Sunset Hills (29-14-3) | No Potential to Cause Effects | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected |
| Wiehle/Sunset Hills Proposed Historic District (29-14) | No Potential to Cause Effects | No Adverse Effect | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| Launders House (29-240) | No Potential to Cause Effects | No Adverse Effect (BRT 3 only) | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected |
| Ratcliff/Meiselman House (29-245) | No Potential to Cause Effects | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected |
| Middleton Farm (29-253) | No Potential to Cause Effects | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected |

| Resource | Baseline Alternative | BRT Alternative | Metrorail Alternative | BRT/Metrorail Alternative | Phased Implementation |
|---|---|---|---|---|---|
| **Dulles Airport** | | | | | |
| Washington Dulles International Airport (53-8) | No Potential to Cause Effects | No Adverse Effect | No Adverse Effect | No Adverse Effect | No Adverse Effect |
| **Loudoun County** | | | | | |
| Cockerille House (53-1100) | No Potential to Cause Effects | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected |
| House, Route 643, Ryan (53-23) | No Potential to Cause Effects | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected |
| House, Route 772 (now Petworth Court), Ryan (53-1095) | No Potential to Cause Effects | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected | No Historic Properties Affected |
| House, Route 772, Ryan (53-24) | No Potential to Cause Effects | No Adverse Effect | No Historic Properties Affected | No Adverse Effect | No Historic Properties Affected |

### Archaeological Resources

The BRT Alternative would not affect the qualifications for the NRHP of any of the known archaeological resources identified in Section 3.5.3.3. The alternative would not result in any long-term negative noise or visual effects or any direct impact on the known archaeological resources. Therefore, no long-term effects would be anticipated on known archaeological resources from the BRT Alternative.

### Historic Architectural Resources

The BRT Alternative would not affect the elements that contribute to the qualifications for the NRHP of the historic architectural resources identified in Section 3.5.3.4. The minor impacts to historic architectural resources are described below.

**Wiehle/Sunset Hills Proposed Historic District (29-14) Reston.** BRT operations in the DAAR would result in exceedance of the FTA impact criterion (58 decibels [dBA]) at this proposed historic district. For Alignments BRT 1 and BRT 2, the projected noise level is 63 dBA, and for Alignment BRT 3 the noise level would be 64 dBA. The existing background noise level in the proposed historic district is 61 dBA and the FTA severe impact criterion is 64 dBA. Predicted noise levels at the historic resources still standing within the proposed historic district (the Robert Wiehle House, the Smith Bowman Distillery, and Sunset Hills) do not exceed the FTA impact criterion, and are estimated to range between 47 and 49 dBA. The portion of the proposed historic district that is closest to the study area (the southeastern region) was used for noise modeling purposes but no longer contains historic structures. The buildings from the former distillery operation that were standing in 1987 when the district was proposed subsequently were demolished. This former distillery property has been developed as part of the Sallie Mae Corporation's landscaped office complex. Thus, impacts associated with the BRT Alternative alignments would be minimal and would not result in an adverse effect on this proposed historic district.

**Dulles Airport.** The configuration under consideration for the Dulles Airport BRT Stop would have minimal impact to the visual environment of the Main Terminal and associated buildings at the Dulles Airport. This resource has been determined eligible for the NRHP because of its unique architectural and historical context and is highly sensitive to changes in the surroundings. The proposed exterior improvements would be located opposite the lowest level of the Main Terminal, in an area already dedicated to ground transportation

functions. The proposed interior improvements—fare collection facilities—would be within the lowest level of the Main Terminal, two levels below the ticketing/departures area, and one level below the arrivals roadways. The fare collection facilities within the existing ground transportation center would be designed to be compatible with their surroundings, in consultation with MWAA and VDHR. Therefore, no long-term effects on the resource from the BRT Alternative are anticipated. This determination of effects would be confirmed via consultation with VDHR, MWAA, and the National Capital Planning Commission (NCPC).

**House, Route 772 (53-24), Ryan.** BRT operations would result in a noise level (57 dBA) that exceeds the FTA impact criterion at this location (56 dBA). The existing background noise at the resource is 57 dBA and the FTA criterion for severe impact is 62 dBA. Thus, the impact associated with Alignment BRT 1 would be minimal and would not result in an adverse effect on this historic resource.

### 3.5.4.3 Metrorail Alternative

#### Archaeological Resources

With the exception of the four sites discussed below, the Metrorail Alternative would not result in any action that would affect the qualifications for the NRHP of any known archaeological resource identified in Section 3.5.3.3.

**Site 44FX0388.** This site was located in the right-of-way for the Dulles Connector Road when it was discovered. No further work was recommended for this site and its importance was noted as minimal. Portions of this undated prehistoric site could be disturbed by the construction of a nearby tie-breaker station.

**Site 44LD0380.** This site has an undated prehistoric component and an early-twentieth-century component. No further work was recommended at this site because the site's resources were sparse and heavily disturbed. If resources remain they could be disturbed by construction of planned facilities or staging areas near the Route 606 Station.

**Site 44LD0383.** Following Phase II testing, this prehistoric site of unknown date was judged not to contain data sources of significant value and no further work was recommended. Following the testing, the site may have been destroyed by the construction of the Dulles Greenway. However, if resources remain at this site, they could be destroyed by construction of the Metrorail alignment.

**Site 44LD0378.** This is a site with both prehistoric and historic components. The prehistoric component is undated, and the historic artifacts were dated to the nineteenth century. It is probable that the site was destroyed by construction of the Dulles Greenway. However, if resources remain at this site, they could be destroyed by construction of the Metrorail alignment. Historic Architectural Resources

The Metrorail Alternative would have minor impacts to three historic architectural resources as discussed below. However, the Metrorail Alternative would not affect the characteristics that contribute to these resources' qualifications for the National Register.

**Ash Grove (29-2), 8900 Ash Grove Lane, Vienna.** Noise from Metrorail operations in the DAAR would exceed the FTA impact criterion (55 dBA) at this historic resource. The proposed noise level for the Metrorail Alternative ranges from 56 dBA (Alignments T1 and T6) to 57 dBA (Alignment T9), while the existing background noise level is 54 dBA. Although this is a noise impact, it does not constitute an adverse effect on this resource.

**Wiehle/Sunset Hills Proposed Historic District (29-14) Reston.** Noise from Metrorail operations in the DAAR would exceed the FTA impact criterion (58 dBA) at this proposed historic district. The projected noise level for the Metrorail Alternative is 62 dBA, while the existing background noise level in the historic district is 61 dBA. The FTA severe impact criterion is 64 dBA. Predicted noise levels at the historic resources still standing within the proposed historic district (the Robert Wiehle House, the Smith Bowman Distillery, and Sunset Hills) do not exceed the FTA impact criterion, and are estimated at 49 dBA. Although this constitutes a noise impact, it does not constitute an adverse effect on this proposed historic district.

**Dulles Airport (53-8).** The Metrorail Alternative alignment would be underground at Dulles Airport. Above ground, one-to-three foot high ventilation shaft outlets would be visible. Adverse visual effects are possible, but should be eliminated or minimized by design adaptations. These changes would not constitute an adverse effect on this resource.

### 3.5.4.4 BRT/Metrorail Alternative

#### Archaeological Resources

With the exception of the one site discussed below, the BRT/Metrorail Alternative would not result in any action that would affect the qualifications for the NRHP of any of the archaeological resources listed in Section 3.5.3.3.

**Site 44FX0388.** This site was located in the right-of-way for the Dulles Connector Road when it was discovered. No further work was recommended for this site and its importance was noted as minimal. Portions of this undated prehistoric site could be disturbed by the construction of a nearby tie-breaker station.

#### Historic Architectural Resources

The BRT/Metrorail Alternative would have minor impacts to three historic architectural resources, as discussed below. However, the BRT/Metrorail Alternative would not affect the characteristics that contribute to these resources' qualifications for the NRHP.

**Wiehle/Sunset Hills Proposed Historic District (29-14) Reston.** Noise from BRT operations in the DAAR would exceed the FTA impact criterion (58 dBA) at this proposed historic district. The projected noise level is 63 dBA, while the existing background noise level in the proposed historic district is 61 dBA. The FTA severe impact criterion is 64 dBA. It should be noted that predicted noise levels at the previously identified historic resources still standing within the proposed historic district (the Robert Wiehle House, the Smith Bowman Distillery, and Sunset Hills) do not exceed the FTA impact criterion, and are estimated to range between 47 and 48 dBA. Although this constitutes a noise impact, it does not constitute an adverse effect on this proposed historic district.

**Dulles Airport (53-8).** Impacts would be the same as those discussed under the BRT Alternative. No long-term visual effects are anticipated.

**House, Route 772 (53-24), Ryan.** BRT operations would result in a noise level (57 dBA) that exceeds the FTA impact criterion (56 dBA) at this location. The existing background noise level at this location is 57 dBA and the FTA severe impact criterion is 62 dBA. Thus, the impact associated with Alignment BRT 1 would be minimal and would not result in an adverse effect on this historic resource.

#### 3.5.4.5 Phased Implementation Alternative

The effects of Phased Implementation would be the same as those anticipated for the Metrorail Alternative, with the exception of the effects at Dulles Airport. As described above for the BRT and Metrorail alternatives, the effects as a result of the BRT Stop are different from those of the underground Metrorail Station. Neither of the effects is anticipated to be adverse. No additional effect is anticipated from the removal of BRT facilities after Metrorail is operational.

### 3.5.5 CONSTRUCTION EFFECTS

Construction effects on cultural resources result when there is direct physical impact. Construction effects could also occur from the operation of heavy equipment on or near a resource. Construction noise and vibration impacts were studied by the project team and were judged to be below the FTA impact criteria for structural damage along the project corridor (see Sections 4.7 and Section 4.8).

#### 3.5.5.1 Baseline Alternative

Under the Baseline Alternative, there would be no construction-related effects to cultural resources from the Dulles Corridor Rapid Transit Project. However, such effects could result from the improvements assumed as part of this alternative. Identification of these effects would be the responsibility of the agencies and jurisdictions implementing the improvements.

#### 3.5.5.2 BRT Alternative

##### Archaeological Resources

Construction activities related to the BRT Alternative would not result in any action that would affect the qualifications for the NRHP for any of the known archaeological resources.

##### Historic Architectural Resources

Similar to the archaeological resources, no construction effects on historic architectural resources would be anticipated from the BRT Alternative.

#### 3.5.5.3 Metrorail Alternative

##### Archaeological Resources

Construction activities related to the Metrorail Alternative would not result in additional impacts that could affect the characteristics that contribute to the qualifications for the NRHP of any of the known archaeological resources.

##### Architectural Resources

With the exception of Dulles Airport, no construction effects on historic architectural resources discussed would be anticipated from the Metrorail Alternative.

During the construction period, there would be short-term impacts to the Dulles Airport terminal. No vibration effects would occur that would exceed FTA criteria. During a portion of the construction period, the area directly over the Dulles Airport underground station, directly in front of the terminal, would be excavated from the surface to allow construction of the station itself. The tunnels leading to and from the Dulles Airport station also would be excavated from the surface, and then covered. During this time, proximity impacts,

including air quality, noise, and visual effects, would occur. None of the proximity impacts would have any long-term effects that would compromise the significance of the resource.

#### 3.5.5.4 BRT/Metrorail Alternative

**Archaeological Resources**

Construction activities related to the BRT/Metrorail Alternative would not result in any action that would compromise the qualification for the NRHP of any of the known archaeological resources.

**Architectural Resources**

Similar to the archaeological resources, no construction effects on the historic architectural resources are anticipated from the BRT/Metrorail Alternative.

#### 3.5.5.5 Phased Implementation Alternative

Construction of this alternative would involve the implementation of BRT and Metrorail over an extended period of time. Although the construction effects would be the same as those described above for the other three alternatives, the timing would be different. The effects of constructing Metrorail through Tysons Corner would add to the effects of constructing BRT from the Orange Line to the end of the study area in Loudoun County. These effects would then be followed by the effects of constructing Metrorail between Tysons Corner and the end of the study area in Loudoun County.

### 3.5.6 MITIGATION

The need for mitigation of impacts on cultural resources will be decided in consultation with the VDHR as described in the Programmatic Agreement (see Appendix H). Potential impacts to currently known architectural resources are due to noise from transit operations. Mitigation measures available to reduce the onset of noise impacts in the study area from BRT and Metrorail operations are described in the *Noise and Vibration Technical Report* (June 2001; Section 3.8). Potential mitigation measures include the reduction of BRT vehicle travel speed in particularly noise-sensitive areas, after-market noise silencers applied to the inside of the BRT engine compartment, and construction of noise barrier walls between the Dulles Toll Road and the affected resource(s). Mitigation measures will be investigated in detail during final design when the alignment designs are finalized.

One archaeological site in Fairfax County (44FX0388) would likely have direct long-term effects from the BRT/Metrorail and Metrorail Alternatives. Three archaeological sites in Loudoun County (44LD0380, 44LD0383, and 44LD0378) would likely have direct long-term effects from the Metrorail Alternative. During construction of the Dulles Greenway, Phase II testing was recommended for one of the Loudoun County sites and was carried out (Site 44LD0383). No further investigation was recommended after the Phase II testing of Site 44LD0383. The Loudoun County sites probably have been at least partially destroyed by construction of the Dulles Greenway or recent commercial development. It is doubtful that any of these four sites contain the research potential or integrity to be eligible for listing in the NRHP. Confirmation of that probability would be discussed with the SHPO. No additional sites would be impacted as a result of the Phased Implementation Alternative. Therefore, additional mitigation would not be required.

Four of the archaeological sites beyond the LOD but within the APE may be eligible for listing in the NRHP: Sites 44FX2299, 44FX1569, 44LD0379, and 44LD0472. Care should be taken during construction-related activities to avoid any direct impact to the sites, which would be including on constraints mapping. Effects on

these sites are not anticipated. Upon selection of a preferred alternative and during the design phase, as appropriate, a cultural resources investigation plan would be developed in consultation with the SHPO as described in the draft Programmatic Agreement. The plan would detail goals and methods to be used prior to construction to locate cultural resources within the APE that have not yet been identified, and to evaluate their eligibility for the NRHP. A preliminary list of areas needing archaeological survey is included in the *Cultural Resources Technical Report* (June 2002), including the facilities proposed near three of the four archaeological sites (Sites 44FX0388, 44LD0380, and 44LD0383) likely to suffer impacts from the project. The fourth archaeological site likely to be affected by the project (44LD0378) is on land in Loudoun County that has been developed twice: once for construction of the Dulles Greenway and again for commercial purposes.

### 3.5.7 SUMMARY OF EFFECTS

A summary of the cultural resources effects described above is presented in Table 3.5-3.

**Table 3.5-3: Summary of Cultural Resources Effects**

| Alternative | Archaeological Impacts | Historic Impacts | Mitigation |
|---|---|---|---|
| Baseline | None | None | None |
| BRT | None | No Adverse Effects (4 resources) | Reduction of BRT noise in sensitive areas. |
| Metrorail | 5 Potential Effects | No Adverse Effects | Consultation with VDHR and SHPO to determine need for mitigation. Development of Cultural Resources Investigation Plan. |
| BRT/Metrorail | 1 Potential Effects | No adverse effects (3 resources) | Consultation with VDHR and SHPO to determine need for mitigation. Development of Cultural Resources Investigation Plan. |
| Phased Implementation | 5 Potential Effects | No Adverse Effects (4 resources) | Consultation with VDHR and SHPO to determine need for mitigation. Development of Cultural Resources Investigation Plan. |

## 3.6 PARKLANDS AND RECREATION AREAS

This section describes existing public parklands and recreation areas located within the study area of the project. An assessment of the long-term operating and short-term construction effects of the Baseline, BRT, Metrorail, BRT/Metrorail, and Phased Implementation alternatives on these resources, and proposed measures to mitigate any potential adverse impacts on parklands, is provided in the following sections.

### 3.6.1 METHODOLOGY

Publicly owned or leased parks and recreation lands (parks) that are located within the proposed limit of disturbance for the various alternatives or immediately adjacent to these areas are analyzed and discussed in this section. The study area for parklands and recreation areas is within 300 feet of the proposed alignments, station areas, S&I Yard, and maintenance and storage facility. After the noise, vibration, and air quality effects (discussed in Chapter 4) were carefully analyzed, this study area was reviewed to ensure it adequately covered all

of the parklands and recreational areas potentially affected. (In Section 3.2, additional parks are discussed. These parks, not located within or immediately adjacent to the limits of disturbance for any of the alternatives, are discussed in that section because they are community facilities in the neighborhoods being analyzed, not because there is a potential for impacts to these facilities.)

Parklands and recreation areas in the study area were identified in coordination with the Fairfax County Park Authority (FCPA), Loudoun County, Northern Virginia Regional Park Authority (NVRPA), and the National Park Service (NPS). Parkland boundaries were confirmed with reviews of park master plans, Alexandria Drafting Company (ADC) maps, aerial photography, comprehensive plans, and information found on the websites of the FCPA, NPS, and NVRPA.

### 3.6.2 EXISTING CONDITIONS

Public parklands and recreation areas within the study area are shown on Figures 3.6-1a and 3.6-1b. The size, ownership, and recreational features for each park identified are summarized in Table 3.6-1. Five agencies have jurisdiction and ownership of parkland resources: National Park Service, Northern Virginia Regional Park Authority, FCPA, Fairfax County School Board, and City of Falls Church School District. One additional recreational facility is on leased private land on an interim basis. All of these parks are in Fairfax County; none were identified in Loudoun County. Each park is described below.

#### 3.6.2.1 Orange Line Connection

George Mason High School is located near the existing West Falls Church Metrorail Station. The school's athletic fields are used for active recreation, are approximately 17 acres in size and are owned by the Falls Church School District. They are used by both the school and the City of Falls Church Parks and Recreation Department for organized recreation including soccer, softball, and baseball.

The FCPA owns Mount Royal Park, located north of I-66 and northwest of Leesburg Pike adjacent to Lemon Road Elementary School in Falls Church. Mount Royal Park is currently a passive park, approximately 3 acres in size that provides an open recreation area. Planned improvements that could change this to an active park include the addition of a picnic area, tot lot, play area, tennis courts, and an exercise area.

Pimmit Run Stream Valley Park is approximately 68 acres in size and is owned and maintained by the Fairfax County Park Authority. This linear, passive park consists of a hiking trail and natural area. In the study area, the park is located on either side of the Dulles Connector Road and north of Idylwood Road. A hiking trail runs through the park and crosses under the Dulles Connector Road. The land under the existing highway bridges is not part of the park, nor is the trail. The Park Authority does not own this land.

Olney Park is an active park that is approximately 18 acres in size, located west of the Dulles Connector Road and south of Olney Road. It is situated directly north of Pimmit Run Stream Valley Park. Olney Park is a neighborhood park that provides a variety of amenities, including two baseball fields, one basketball court, tennis courts, a hiking trail, natural area, open area, picnic area, playground, tot lot, restroom facilities, and a parking lot. The park is owned and maintained by the Fairfax County Park Authority.

Westgate Park is approximately 12 acres in size and is owned and operated by the FCPA. It is situated south of Route 123 and Magarity Road, where a portion of the park intersects Scotts Run Stream Valley Park. Westgate Park is an active park with two baseball fields, two lighted tennis courts, a picnic area, and an open area.


LEGEND

Parklands and Recreational Areas

County Boundary

Existing Metrorail Orange Line and Stations

0 3000 6000 FEET

Figure 3.6-1a

## Public Parkland and Recreational Areas

Dulles Corridor Rapid Transit Project


LEGEND

Parklands and Recreational Areas

County Boundary

0 3000 6000 FEET

Figure 3.6-1b

# Public Parkland and Recreational Areas

Dulles Corridor
Rapid Transit Project

**Table 3.6-1: Parklands Ownership**

| Park Name | Address | Ownership | Acres | Playgrounds | Ball Fields | Tot Lot | Picnic Areas | Play Courts | Community Center | Restrooms | Open Area | Trails | Historic Site |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| George Mason High School | 7124 Leesburg Pike | FCSD | 17 | | ● | | | | | | | | |
| Mount Royal Park | 7141 Idylwood Road | FCPA | 3 | | | | | | | | ● | | |
| Pimmit Run Stream Valley Park | Great Falls Street/Lemon Road | FCPA | 67.92 | | | | | | | | ● | ● | |
| Olney Park | 1840 Olney Road | FCPA | 18.02 | ● | ● | ● | ● | ● | | ● | ● | ● | |
| Westgate Park | 7508 Magarity Road | FCPA | 12.5 | | ● | | ● | ● | | | ● | | |
| Scotts Run Stream Valley Park | Chain Bridge Road/Magarity Road | FCPA | 23.62 | | | | | | | | ● | ● | |
| McLean Hamlet Park | 8119 Dunsinane Court | FCPA | 17.1 | | | | | | | | ● | ● | |
| Ash Grove Historic Site | Leesburg Pike/Dulles Toll Road | FCPA | 12.3 | | | | ● | | | | ● | | ● |
| Wolf Trap Farm Park for the Performing Arts | 1551 Trap Rd. | NPS | 130 | | | | ● | | | ● | ● | | |
| Meadowlark Gardens Regional Park | 9750 Meadowlark Gardens Court | NVRPA | 95 | | | | ● | | ● | ● | ● | ● | |
| Difficult Run Stream Valley Park | Browns Mill Road/ Beulah Road | FCPA | 863.33 | | | | | | | | | ● | |
| Tamarack Park | 1850 Horseback Trail | FCPA | 20.85 | | | | | | | | ● | ● | |
| Washington & Old Dominion Railroad Regional Park | 21293 Smiths Switch Road | NVRPA | 45 miles long and 100 feet wide | | | | | | | | | ● | |
| Hutchison Elementary School Athletic Fields | 13209 Parcher Avenue | FCPS | 34.8 | ● | ● | | | | | | | | |

FCPA: Fairfax County Park Authority, FCPS: Fairfax County Public Schools, FCSD: Falls Church School District, NVRPA: Northern Virginia Regional Park Authority

The majority of Scotts Run Stream Valley Park is located north of the DAAR—west of the Capital Beltway. Approximately 12 acres is within or near the study area, especially that which is located at Route 123 and Colshire Drive. In addition, the parkland is not contiguous along Scotts Run. The trail starts north of the DAAR and Dulles Toll Road, which divides it, then follows the stream as it flows to the south of Route 123 and east of Meadow Road where most of the parkland is located. This linear park consists of an open recreation area that is owned and maintained by the Fairfax County Park Authority.

#### 3.6.2.2 Tysons Corner

McLean Hamlet Park, approximately 17 acres in size, is located north of the DAAR and Dulles Toll Road on the east side of International Drive. McLean Hamlet Park is a passive park, owned by the Fairfax County Park Authority, consisting of a natural area and an open area.

Ash Grove Historic Site is approximately 12 acres in size and is located at the northwest intersection of Route 7 and the DAAR and Dulles Toll Road. Ash Grove Historic Site was dedicated to Fairfax County Park Authority by the developer of Tysons Village townhouses in compliance with approved proffers, which transfer land from one owner to another. This active park consists of an historic house, detached brick kitchen, and a wood-framed smokehouse.

#### 3.6.2.3 Mid-Corridor

Wolf Trap Farm Park for the Performing Arts, approximately 130 acres in size, is an active park located north of the DAAR and Dulles Toll Road at Trap Road. The late Catherine Filene Shouse founded Wolf Trap through a donation of her farmland to the federal government, and provided funds for construction of a 6,800-seat indoor/outdoor theater. The gift was accepted by an Act of Congress in 1966 and Wolf Trap's larger venue, the Filene Center, opened in 1971 as a public/private partnership between the Wolf Trap Foundation and the U.S. Department of the Interior, National Park Service. In 1981, Mrs. Shouse also donated the land and funds for an indoor theater constructed from two adjacent eighteenth-century barns, each moved from upstate New York and rebuilt on their present site.

Meadowlark Gardens Regional Park is approximately 95 acres in size and is located south of the DAAR and Dulles Toll Road on Meadowlark Gardens Court in Vienna. Meadowlark Gardens Regional Park is an active park owned by the Northern Virginia Regional Planning Agency. Features of the park include gardens, meeting and reception rooms, gazebos, trails, and a gift shop.

Difficult Run Stream Valley Park, approximately 863 acres in size, is owned and operated by the FCPA. This passive park consists of a hiking and equestrian trail that extends into the Wolf Trap Meadow Subdivision. Within the study area, this park is located on both sides of the DAAR and Dulles Toll Road, approximately one mile west of Route 674. The land under the existing highway bridges is not part of the park, nor is the trail. The Park Authority does not own this land.

Tamarack Park, approximately 20 acres in size, is a passive neighborhood park located in the Town of Vienna. Tamarack Park is owned and operated by the Fairfax County Park Authority and serves the local community with a bike trail, equestrian trail, nature trail, natural area, and an open area.

W&OD Railroad Regional Park, approximately 45 miles long and 100 feet wide, is a recreational trail that extends from Arlington County to Loudoun County. This passive park consists of a paved trail for walking, running, and bicycling. It also includes a 32-mile-long adjacent gravel trail for horseback riding. The trail

crosses the DAAR and Dulles Toll Road approximately one-half mile east of Wiehle Avenue. The W&OD Railroad Regional Park is owned and maintained by Northern Virginia Regional Park Authority.

The Hutchison Elementary School and athletic fields, approximately 35 acres in size, border the DAAR and Dulles Toll Road and are located southwest of Parcher Avenue in Herndon. Through an agreement with Fairfax County Public Schools, the FCPA uses the school's athletic fields after normal school hours. This active park has two baseball fields and six football fields.

Land proffered by a private landowner for a transit facility is currently leased to Fairfax County Public Schools on an interim basis for use as a soccer field. The field is used by both the FCPA and the Hutchison Elementary School. Because this site is not a public park, it is not shown on the map of public parklands, or included in Table 3.6-1, or included in this assessment.

Land proffered to the FCPA (known as the Dulles Proffer), approximately 60-acres in size, is located south of the DAAR and Dulles Toll Road east of Horse Pen Road. This parcel was privately owned by the Toll Brothers builders and was proffered to FCPA in 2000. The Park Authority has developed plans for a future public park at this location. Acquisition of this parcel by the Park Authority is dependent upon rezoning and development approvals.

#### 3.6.2.4 Loudoun County

In addition to these publicly owned parklands within the study area, the Claude Moore Outdoor Education Center**,** a private recreational facility, is located on Route 772, south of the Dulles Greenway. This 60-acre parcel is currently used on an exclusive basis by the National Capital Area Council Boy Scouts of America for camping and outdoor education through a contract with the owner, the Claude Moore Charitable Foundation. It is not open to the general public and is being used temporarily by the Boy Scouts while their permanent facility is under construction. Because this site is not considered a public park, it is not shown on the map of public parklands.

### 3.6.3 LONG-TERM EFFECTS

This section summarizes the potential long-term effects associated with operation of the Baseline, BRT, Metrorail, BRT/Metrorail, and Phased Implementation alternatives on the parklands described above. Table 3.6-2 summarizes the long-term effects of the project on parklands.

**Table 3.6-2: Parkland Effects**

| Resource | Baseline Alternative | BRT Alternative | Metrorail Alternative | BRT/Metrorail Alternative | Phased Implementation |
|---|---|---|---|---|---|
| **Orange Line Connection** | | | | | |
| George Mason High School Athletic Fields | – | – | – | – | -- |
| Mt. Royal Park | – | – | Minimal construction-related effects. | Minimal construction-related effects. | Minimal construction-related effects. |
| Pimmit Run Stream Valley Park | – | – | Minor construction-related effects. | Minor construction-related effects. | Minor construction-related effects. |
| Olney Park | – | – | Minor construction-related effects. | Minor construction-related effects. | Minor construction-related effects. |

| Resource | Baseline Alternative | BRT Alternative | Metrorail Alternative | BRT/Metrorail Alternative | Phased Implementation |
|---|---|---|---|---|---|
| **Tysons Corner** | | | | | |
| McLean Hamlet Park | – | Minimal construction-related effects. | Minimal construction-related effects. | Minimal construction-related effects. | Minimal construction-related effects. |
| Ash Grove Historic Site | – | – | Slight noise increase above FTA criteria. Minor construction-related effects. | Slight noise increase above FTA criteria. Minor construction-related effects. | Slight noise increase above FTA criteria. Minor construction-related effects. |
| Scotts Run Stream Valley Park | – | – | Slight visual impact along Route 123. At Tysons East Station, minor construction-related effects. | Slight visual impact along Route 123. At Tysons East Station, minor construction-related effects. | Slight visual impact along Route 123. At Tysons East Station, minor construction-related effects. |
| Westgate Park | – | – | Minor construction-related effects. | Minor construction-related effects. | Minor construction-related effects. |
| **Mid-Corridor** | | | | | |
| Wolf Trap Farm Park | – | – | – | – | -- |
| Meadowlark Gardens Regional Park | – | – | – | – | -- |
| Difficult Run Stream Valley Park | – | – | Minor construction-related effects. | – | Minor construction-related effects. |
| Tamarack Park | – | – | – | – | -- |
| W&OD Railroad Regional Park | – | – | Noise increase above FTA criteria. Visual effects due to near elimination of light well. Minor construction-related effects. | – | Noise increase above FTA criteria. Visual effects due to near elimination of light well. Minor construction-related effects. |
| Hutchison Elementary School Athletic Fields | – | – | – | – | -- |
| Dulles Proffer | – | Minor construction-related effects. | Minor construction-related effects. | Minor construction-related effects. | Minor construction-related effects. |

#### 3.6.3.1 Baseline Alternative

Under the Baseline Alternative, there would be no effects to parks and recreation areas from the Dulles Corridor Rapid Transit Project. However, there could be effects to the resources from the improvements assumed under this alternative. Identification of these effects would be the responsibility of the agencies and jurisdictions implementing the improvements. In addition, the Baseline Alternative would not provide the benefit of increased transit access to recreational facilities in the study area.

#### 3.6.3.2 BRT Alternative

The potential impacts of the BRT Alternative on the parklands and recreational areas are described below.

### Alignment BRT 1

**Orange Line Connection.** No significant impacts to parklands and recreational areas would occur under Alignment BRT 1.

**Tysons Corner.** The proposed Tysons Corner portion of the BRT Alternative is located within the vicinity of McLean Hamlet Park and Ash Grove Historic Site. However, no significant impacts to McLean Hamlet Park or Ash Grove Historic Site would result under this alignment alternative.

**Mid-Corridor.** The Mid-Corridor portion of Alignment BRT 1 would be located within the vicinity of Wolf Trap Farm Park for the Performing Arts, Meadowlark Gardens Regional Park, Difficult Run Stream Valley Park, Tamarack Park, the W&OD Railroad Regional Park, and the Dulles Proffer. However, the alignment would operate within the existing lanes of the DAAR, and no impacts to these parklands would result from the BRT Alternative.

The Wiehle Avenue BRT Station, located west of the W&OD trail crossing of the DAAR and Dulles Toll Road, would not be visible from the trail, nor would it result in any impacts to the trail.

The Route 28 BRT Station would have no long-term, negative air quality or noise impacts to the Dulles Proffer. The station facilities, including bus bays, Kiss & Ride spaces, an entrance pavilion, pedestrian bridge, and station platform, would not affect the planned parkland, which is not immediately adjacent to the station facilities. Because of intervening vegetation, the station facilities would likely not be visible from the planned park. The Route 28 BRT Station would be within a one-half-mile walking distance of the Dulles Proffer and would provide transit access for future park users.

### Alignment BRT 2

The effects associated with BRT 2 would be identical to those described above for BRT 1.

### Alignment BRT 3

The effects associated with BRT 3 would be identical to those described above for BRT 1.

## 3.6.3.3 Metrorail Alternative

### Orange Line Connection

The Orange Line Connection section of the Metrorail Alternative would be located within the vicinity of George Mason High School, Mount Royal Park, Pimmit Run Stream Valley Park, and Olney Park, as described below.

The Metrorail Alternative would expand the West Falls Church S & I Yard. However, there would be no air quality, noise, or visual impacts to George Mason High School athletic fields, which are located across I-66 from the yard. Additionally, the proposed expansion of the yard would not result air quality, noise, or visual impacts to Mount Royal Park. The additional storage tracks to be added at the yard would be located near the center of the facility, separated from the park by other storage tracks and the connector tracks. The overhead connector to the Metrorail alignment in the Dulles Connector Road would also not be visible and would not result in additional noise or air quality impacts to the park.

The Metrorail Alternative would not significantly alter air quality at Pimmit Run Stream Valley Park, nor would there be significant noise or vibration impact. A new bridge to accommodate the Metrorail Alternative would be constructed over the trail that connects the parkland on opposite sides of the Dulles Connector Road.

However, this trail and the land under the highway overpasses are not parkland. Generally, the new bridge would be screened from view from the parkland by existing walls and trees and by the existing Dulles Connector Road bridges.

The Metrorail Alternative would not result in air quality, noise, or visual impacts to Olney Park. Existing walls and landscaping would buffer the park from impacts.

### Tysons Corner

Within the Tysons Corner section of the Metrorail Alternative, the proposed improvements would be located in the vicinity of McLean Hamlet Park, Scotts Run Stream Valley Park, Westgate Park, and Ash Grove Historic Site, as described below. Impacts would be the same under Alignments T1, T4, T6, T9, or T9 Design Option.

No effects are anticipated at McLean Hamlet Park. At the Ash Grove Historic Site, air quality and visual impacts would not be anticipated. However, due to the existing high noise levels from the surrounding roadways and the slight increase attributable to the Metrorail Alternative, a noise impact would occur that is slightly over the FTA criteria at the Ash Grove Historic Site. Mitigation is proposed to reduce this impact below the criteria (see Section 4.7.8).

The Tysons East Station associated with the Metrorail Alternative would be located directly adjacent to Scotts Run Stream Valley Park. No negative, long-term air quality or noise impacts on the park would result from the Metrorail Alternative. Visual impacts would be minimal, because the park is generally screened from views of the facilities, except immediately adjacent to Route 123. The Tysons East Station would be adjacent to Scotts Run Stream Valley Park and would provide improved transit access for park users. In addition, the stormwater management pond would be designed and maintained according to best management practices (BMPs) to eliminate potential impacts to Scotts Run from the uncontrolled release of stormwater.

The Tysons East Station associated with the Metrorail Alternative would have no negative, long-term air quality, noise, or vibration impacts on Westgate Park. The station and alignment would not be visible from the park, so no visual impacts would occur. The Tysons East Station would be within a half-mile walking distance of the Westgate Park and would provide improved transit access for park users.

### Mid-Corridor

The proposed Metrorail Alternative, with its alignment in the median of the DAAR, would be located in the vicinity of Wolf Trap Farm Park for the Performing Arts, Meadowlark Gardens Regional Park, Difficult Run Stream Valley Park, Tamarack Park, the W&OD Railroad Regional Park, the Hutchison Elementary School athletic fields, and the Dulles Proffer, as described below.

The Metrorail Alternative would not result in air quality, noise, or visual impacts at Wolf Trap Farm Park. The park would be buffered from the rail line by the existing highways, a noise barrier wall, and existing landscaping.

The Metrorail Alternative would not result in air quality, noise or visual impacts at Meadowlark Gardens Regional Park. The park would be buffered from the Metrorail alignment by the existing highways, other roadways, development, and landscaping.

The Metrorail Alternative would not cause air quality, noise, or visual impacts at Difficult Run Stream Valley Park. The alternative would provide a new bridge that would span the trail that connects the two portions of the park on either side of the DAAR and Dulles Toll Road. The trail and land under the highway overpasses

are not parkland. The park would be screened from the bridge by the existing DAAR and Dulles Toll Road bridges.

The Metrorail Alternative would not result in air quality, noise, or visual impact to Tamarack Park. The park would be buffered from the Metrorail alignment by the existing highways, a noise barrier wall, development, and landscaping.

The Metrorail Alternative would not affect air quality at the W&OD Railroad Regional Park. Noise levels at the new Metrorail crossing are expected to exceed the impact criteria. However, increased noise levels in this location, an area already affected by the four highway bridges of the DAAR and Dulles Toll Road, would not lead to a degradation of the park experience. The W&OD Railroad Regional Park is crossed by many other transportation facilities and parallels I-66 for several miles, so such noise impacts are not unexpected by trail users.

The new bridge would also result in a visual impact to the trail. The area between the existing highway bridges now provides a light well, limiting the "dark tunnel" effect on the trail users. The planned widening of the highway bridges (not as part of this project) and the new bridge for the Metrorail would nearly eliminate this light well. Therefore, visual impacts would occur. These impacts can be mitigated, however, with the incorporation of natural and artificial lighting under the bridge. No bridge piers would be built in the park; piers would be spaced to avoid parklands, and the bridge would span the park completely. The alternative would be constructed in compliance with the Northern Virginia Regional Park Authority *Guidelines for the Development of W&OD Trail Bridge Crossings*.

The Wiehle Avenue Metrorail Station, located west of the W&OD trail crossing of the DAAR and Dulles Toll Road, would not be visible from the trail, nor would it result in air quality or noise impacts to the trail. This station would provide access to the trail.

The Route 28 Station would have no long-term, negative air quality or noise impacts to the Dulles Proffer. The station facilities would not affect the planned parkland, which is not immediately adjacent to the station facilities. Because of intervening vegetation, the station facilities would likely not be visible from the planned park. The Route 28 Station would be within a half-mile walking distance of the Dulles Proffer and would provide transit access for future park users.

#### 3.6.3.4 BRT/Metrorail Alternative

The impacts related to the BRT/Metrorail Alternative in the eastern portion of the alignment (Orange Line Connection and Tysons Corner) would be the same as those for the Metrorail Alternative.

One site in the Tysons Corner area would differ in impacts, however, under the BRT/Metrorail Alternative. The Tysons West Station associated with the BRT/Metrorail Alternative, with station facilities including bus bays, Kiss & Ride spaces, park-and-ride facilities, and retail development, would have no negative, long-term air quality, noise, vibration, or visual impacts on Ash Grove Historic Site. The historic site would be buffered from the proposed station facilities by existing development. On the DAAR, BRT would be used under this alternative, and would not affect the Ash Grove Historic Site. The Tysons West Station would be within a half-mile walking distance of the Ash Grove Historic Site and would provide improved transit access for park users.

The impacts related to the BRT portion of the BRT/Metrorail Alternative (west of Tysons Corner) would be the same as those for the BRT Alternative.

#### 3.6.3.5 Phased Implementation Alternative

The effects of Phased Implementation would be the same as those anticipated for the Metrorail Alternative. No additional effects over those identified for the Metrorail Alternative would result from first implementing BRT. In addition, no additional effects are anticipated from removal of BRT facilities after Metrorail is operational.

### 3.6.4 CONSTRUCTION EFFECTS

This section summarizes the potential construction effects associated with each Dulles Corridor Rapid Transit Project alternatives on existing parklands and recreation areas. Each of the parks previously described was evaluated for potential construction effects.

#### 3.6.4.1 Baseline Alternative

Under the Baseline Alternative, there would be no construction-related impacts to parklands from the Dulles Corridor Rapid Transit Project. However, such effects could result from the improvements assumed as part of this alternative. Identification of these effects would be the responsibility of the agencies and jurisdictions implementing the improvements.

#### 3.6.4.2 BRT Alternative

Construction activities during the building of the Spring Hill Road BRT Station would temporarily affect McLean Hamlet Park. McLean Hamlet Park would be within 500 feet of the proposed station facility and short-term increases in noise, vibration, and air-borne particulates would be expected during construction.

Construction of the Route 28 BRT Station would temporarily affect the Dulles Proffer. This parcel would be subject to short-term increases in noise, vibration, and airborne particulates. There would be no impact to park facility use or access during construction of the BRT Alternative.

There would be no impact to park facility use or access during construction, and no parklands would be used for construction staging areas, and parklands would be avoided when siting construction staging areas.

#### 3.6.4.3 Metrorail Alternative

Minimal construction-related air and noise impacts could occur at the Mount Royal Park from the addition of storage tracks and the construction of the connector tracks at the West Falls Church S&I Yard.

Construction of a bridge over Pimmit Run Stream Valley Park for the Metrorail Alternative would cause a temporary impact by increasing noise, vibration, airborne and waterborne particulates, and sediment.

Construction of the Tysons East Station associated with the Metrorail Alternative would temporarily affect Scotts Run Stream Valley Park. Due to construction, temporary increases in noise, vibration, and airborne particulates would occur.

At Olney Park, Westgate Park, and the Ash Grove Historic Site, temporary increases in noise, vibration, and airborne particulates due to construction of the Metrorail Alternative could occur. There would be no impact to park facility use or access during construction of the Metrorail Alternative.

Construction of a bridge over Difficult Run Stream Valley Park for the Metrorail Alternative would cause a temporary impact by increasing noise, vibration, and airborne and waterborne particulates.

Construction of a bridge over W&OD Railroad Regional Park, using simple beam techniques, would result in temporary increases in noise, vibration, and airborne particulates. No bridge piers would be placed in the park; piers would be spaced in order to avoid parklands.

At the Dulles Proffer, temporary increases in noise, vibration, and air-borne particulates due to construction of the Route 28 Station could occur. There would be no impact to park facility use or access during construction of the Metrorail Alternative.

There would be no impact to park facility use or access during construction, and parklands would be avoided when siting construction staging areas.

#### 3.6.4.4 BRT/Metrorail Alternative

Construction-related impacts at Mount Royal Park, Pimmit Run Stream Valley Park, Scotts Run Stream Valley Park, Olney Park, Westgate Park, and Ash Grove Historic Site would be the same as under the Metrorail Alternative.

#### 3.6.4.5 Phased Implementation Alternative

Construction of this alternative would involve the implementation of BRT and Metrorail over an extended period of time. Although the construction effects would be the same as those described above for the other three alternatives, the timing would be different. The effects of constructing Metrorail through Tysons Corner would add to the effects of constructing BRT from the Orange Line to the end of the study area in Loudoun County. These effects would then be followed by the effects of constructing Metrorail between Tysons Corner and the end of the study area in Loudoun County.

### 3.6.5 MITIGATION

This section summarizes the mitigation measures proposed for each of the alternatives under study.

#### 3.6.5.1 Baseline Alternative

Mitigation is not recommended under the Baseline Alternative.

#### 3.6.5.2 BRT Alternative

The BRT Alternative would not result in long-term adverse impacts to parks and recreational facilities in the study area; therefore mitigation is not recommended.

#### 3.6.5.3 Metrorail Alternative

Noise impacts would result from the Metrorail Alternative at the W&OD Railroad Regional Park. No mitigation is recommended at this location, however, because of the high existing noise levels caused by the highway.

Visual impacts would result from the Metrorail Alternative at the W&OD Railroad Regional Park. Mitigation for these impacts is recommended in Section 3.4.6.

Temporary construction effects associated with the Metrorail Alternative at Pimmit Run Stream Valley Park, Scotts Run Stream Valley Park, Difficult Run Stream Valley Park, and the W&OD Railroad Regional Park would be mitigated through the use of BMPs to control stormwater and sediment and minimize disruption of regular park activities. Continued access to the trails at Pimmit Run Stream Valley Park and Difficult Run Stream Valley Park would be maintained during hours of peak use. At the W&OD Railroad Regional Park, construction would be conducted in compliance with the *Northern Virginia Regional Park Authority Guidelines for the Development of W&OD Trail Bridge Crossings* and continued access to the park would be maintained during hours of peak use. Construction would be timed for low-use periods.

#### 3.6.5.4 BRT/Metrorail Alternative

The BRT/Metrorail Alternative would not result in long-term adverse impacts to parks and recreational facilities in the study area; therefore mitigation is not recommended.

#### 3.6.5.5 Phased Implementation Alternative

The mitigation measures for this alternative would be identical to those for the Metrorail Alternative.

### 3.6.6 SUMMARY OF EFFECTS

A summary of the potential effects on parklands and recreation areas is presented in Table 3.6-3.

**Table 3.6-3: Summary of Parklands and Recreation Areas Effects**

| Alternative | Effects | Mitigation |
|---|---|---|
| Baseline | None | None |
| BRT | Minimal/Minor construction-related impacts at 2 parks. | None |
| Metrorail | Minimal/Minor construction-related impacts at 7 parks.<br>Noise increases above FTA criteria at 2 parks.<br>Visual impacts at 1 park. | Construction BMPs<br>None<br>Landscaping |
| BRT/Metrorail | Minimal/Minor construction-related impacts at 6 parks.<br>Noise increases above FTA criteria at 1 park<br>Visual impacts at 1 park. | Construction BMPs<br>None<br>Landscaping |
| Phased Implementation | Minimal/Minor construction-related impacts at 6 parks.<br>Noise increases above FTA criteria at 1 park<br>Visual impacts at 1 park. | Construction BMPs<br>None<br>Landscaping |

## 3.7 SAFETY AND SECURITY

This section describes safety and security issues in the existing Metrorail and Metrobus system, hereafter referred to as the "Metro System," and those associated with each of the proposed project alternatives. Safety refers to providing safe conditions for passengers, employees, and pedestrians within the Metro System. Security refers to the enforcement of laws and protection of passengers, employees, and pedestrians within the Metro System.

### 3.7.1 LEGAL AND REGULATORY CONTEXT

WMATA's top priority is to provide a safe and secure environment. Among these are the requirements of the Occupational Safety and Health Administration (OSHA) and the Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG). Other agencies whose guidelines WMATA follows include applicable federal, state, and local transportation, fire, and safety agencies. Because the Dulles Corridor Rapid Transit Project would be located in the Commonwealth of Virginia, WMATA would abide by the codes and regulations of VDOT and DRPT. In addition, WMATA has its own safety procedures for construction and operations of its facilities.

WMATA also adheres to the National Fire Protection Association (NFPA) 130, Standard for Guideway Transit and Passenger Rail System (2000 Edition) and Executive Order 13045, Protection of Children from Environmental Health Risks. NFPA 130 is an industry standard designed to cover emergency situations and the potential safety concerns in a mass transit system such as the Metrorail system. Executive Order 13045 seeks to reduce the environmental health and safety risks to children who may be disproportionately affected because of their small size relative to adults, and because they may be less able to protect themselves from accidents.

Because WMATA is the current regional transit operator, its standards have been assumed as representative standards for transit operations.

### 3.7.2 METHODOLOGY

Safety and security was determined by identifying the safety and security concerns related to the construction, operation, and maintenance of the alternatives proposed for the project. These concerns were developed, in part, with reference to industry standards, and in compliance with government regulations. Once identified, they were compared to existing WMATA practices and procedures. If the existing practices and procedures adequately covered the safety and security concern, no impact was deemed to occur. The study area for safety and security was the limit of disturbance for the proposed improvements.

### 3.7.3 EXISTING CONDITIONS

This section discusses WMATA's current safety and security measures for both patrons and employees. Safety and security procedures related to construction activities are discussed in Section 3.7.5.

#### 3.7.3.1 Patrons

Existing WMATA procedures and its adherence to applicable federal, state, local, and industry standards ensure that safety and security concerns related to a patron's access to stations and the use of the Metro System's facilities including stations, parking areas, trains, and buses, are dealt with adequately.

## Access

The following list is WMATA's ranking of priorities, in descending order from first to sixth, for patron access and proximity to Metrorail stations:

- Pedestrian traffic (1st). Safe pedestrian access to the Metro System is WMATA's highest priority in site planning. Adequate pedestrian circulation routes must be provided, with an emphasis on avoiding pedestrian/vehicular conflicts. Where feasible, grade-separated crossings should be provided along major vehicular arteries. All pedestrian routes should be well lit, designed with good visibility, and with clear signage. The pedestrian path should be as direct as possible and unless the path is weather-protected, it should be no longer than 1,500 feet.
- Accessible Route (2nd). All facilities would be designed to accommodate disabled persons according to ADAAG guidelines. Long-term accessible parking would be provided in park-and-ride areas, located as close to the station as possible. In no case should a disabled person be required to maneuver behind parked cars to reach entrances, ramps, walkways, or elevators. Accessible auto and van parking spaces should be located adjacent to every station where park-and-ride facilities are located. Bicycles are also considered a second-level priority. Bicycle storage areas should be located as close to the station entrance as possible without requiring cyclists to cross the main pedestrian areas. Bicycle lockers and racks should be located as close to the kiosk as possible and away from bushes and shrubs.
- Metrobus (3rd). Bus platforms would be located adjacent to station entrances and should be designed such that pedestrian paths from the bus stops do not cross the bus lanes. Passengers would be discharged directly onto the platform and a continuous canopy should cover waiting areas for bus passengers. Two benches per bus stop should be provided.
- Kiss & Ride (4th). A Kiss & Ride area is a passenger drop-off and pick-up facility, and also serves as short-term parking. Access to the Kiss & Ride area would be separated from the entrances to park-and-ride facilities. A taxi queue should be provided along the curb near the station entrance. Traffic lanes in Kiss & Ride areas would be wider than normal to facilitate ease of circulation and passenger pick-up and drop-off. Drop-off areas should be as close to station entrances as possible without crossing the bus area.
- High Occupancy Vehicle (HOV) (5th). The HOV function is a facility designated at specific stations with access to major arteries or limited highway access. It consists of commuter bus and van pool spaces, and could be used to accommodate oversized vehicles such as recreational vehicles.
- Park-and-Ride (6th). Park-and-ride facilities, both surface parking lots and parking garages, would include spaces for standard cars and accessible spaces as required by ADAAG. Payment systems must not disrupt other parts of the station facility or nearby streets. All queues should occur within the parking facility. The desired walking distance between the park-and-ride lot and station entrance is 1,000 feet, with a maximum allowable distance of 1,500 feet along pedestrian paths. If paths are weather protected, the distance could be greater than 1,500 feet. Exclusive access to parking lots from arterial streets should be provided. If access roads are used, they should provide clear and direct access to the parking lots. Parking lots should be screened from surrounding communities and sited to avoid adverse impact on the community they serve. Landscaping and future development should also be considered in the siting of parking garages.

### Stations and Facilities

Metrorail stations and facilities are designed to provide open and unobstructed lines-of-sight. Stations are well lit and equipped with call boxes, kiosks, and a public-address system. All facilities are designed in accordance with ADAAG Guidelines. Escalators are signed and emergency stop features are easily accessible. Stairwells and elevators are clearly signed. Station manager kiosks are located adjacent to fare collection. Many stations and parking facilities on the Metrorail system are monitored by closed-circuit television (CCTV). In addition, many stations employ personnel to control passenger traffic and monitor the platforms during peak periods.

### Trains

Each Metrorail train car contains safety features designed to maintain a safe passenger and employee environment. Passenger-activated safety measures include:

- Intercoms to the train operator;
- Fire extinguishers; and
- Emergency doors.

Operator-activated safety features include:

- Driver operation of doors;
- Two-way radio between train operator to central control; and
- Onboard public address system to passengers.

Other existing safety and security features include:

- Safety zones under the platform to allow passengers who fall into the trainway to avoid the train;
- Hotlines from central control to police and fire departments;
- Automated fire protection systems in stations and tunnels;
- Call boxes,
- Passenger information displays on platforms; and
- Cellular phone service.

### Buses

WMATA operates a variety of buses in its fleet, including commuter buses, low-floor transit buses, and articulated buses. Safety features onboard buses include the following:

- Emergency escape windows;
- Manual door releases;
- Ceiling escape hatches;
- Fire extinguishers;
- Two-way radios from operators to central control; and
- Emergency silent alarms.

### 3.7.3.2 Employees

WMATA has a variety of safety rules and procedures that ensure compliance with OSHA standards. The following is a short list of some of the measures used to ensure the safety of employees:

- New employee training;
- Industrial hygiene training and education;
- Handling of chemical, physical, and biological hazards;
- Right-of-way safety;
- Accident and emergency procedures; and
- Safety awards.

### 3.7.3.3 Existing Pedestrian/Motorist Safety

At existing stations, every effort has been made to minimize pedestrian and motorist conflicts through the design of the station. However, conflicts still arise, especially at some suburban stations where pedestrians must cross access roads to reach the stations and parking lots. At urban stations, pedestrians encounter curbside bus and taxi services and most conflicts result from crossing city streets.

A discussion of pedestrian crossings in the study area is included in *Traffic Analysis and Station Access Study (TASAS) Technical Report,* June 2002.

### 3.7.3.4 Existing Operational Safety Measures

WMATA verifies compliance with its safety rules and regulations through the following system of checks:

- Internal safety audit process;
- New systems;
- Operations systems;
- Occupational safety and health;
- Fire protection;
- Safety Information and reporting;
- Safety training;
- Environmental protection verification; and
- Verification of substance abuse/Employee Assistance Program.

In addition to these programs, WMATA has a law enforcement agency with more than 300 sworn police officers. MTPD officers provide a variety of law enforcement and public safety services on the Metro System and have arrest powers and jurisdiction for crimes on or against WMATA facilities throughout the 1,500-square mile Transit Zone that includes Maryland, Virginia, and the District of Columbia. Crime in the Metro System varies by location, with most crime occurring in parking lots of the outlying areas of the system. Table 3.7-1 lists numbers of crimes from 1996-2000 by location on the system. Crimes include arson, assault, larceny, motor vehicle theft, attempted motor vehicle theft, homicide, and robbery.

**Table 3.7-1: Numbers of Crimes by Location**

| Location | 1996 | 1997 | 1998 | 1999 | 2000 |
|---|---|---|---|---|---|
| Bus | 68 | 78 | 56 | 69 | 52 |
| Rail | 406 | 312 | 334 | 232 | 333 |
| Parking Lots | 755 | 628 | 726 | 666 | 686 |

## 3.7.4 LONG-TERM EFFECTS

This section describes the long-term operational effects of each of the alternatives.

### 3.7.4.1 Baseline Alternative

Under the Baseline Alternative, there would be no safety and security related effects from the Dulles Corridor Rapid Transit Project. However, there could be effects from the improvements assumed under this alternative. Identification of these effects would be the responsibility of the agencies and jurisdictions responsible for implementing the improvements.

### 3.7.4.2 BRT Alternative

The BRT Alternative, including its three alignment options, is described in Section 2.3.1. For the purposes of the analysis used in this Draft EIS, it was assumed that WMATA would be the operator of the BRT system. Increased traffic and pedestrians around BRT stations, especially during peak times, could lead to increased vehicle conflicts in parking areas and surrounding roadways and crossings. Delays at intersections could also result. Because the BRT Alternative would share right-of-way with the DAAR, the potential for traffic accidents involving a BRT vehicle exists, especially during adverse weather conditions. Under BRT 1, the BRT Maintenance and Storage Facility would be located on MWAA property, however no safety and security adverse impacts are anticipated from its construction or operation.

#### Stations and Stops

Among the safety and security concerns are the threat of personal crime, car theft or burglary, fire, and terrorism. New BRT stations would be constructed with the same safety features as existing Metrorail stations including designated parking, Kiss & Ride, and pedestrian areas. Transit areas would be signed and lighted for directing pedestrians and motorists to appropriate and safe areas. No impacts to pedestrians or motorists are anticipated under this alternative.

#### Roadways

A potential conflict exists between BRT vehicles and other vehicles on the road. However, the operations of the BRT system would be designed to minimize such conflicts.

#### Neighborhoods

The safety and security procedures described above would be implemented at all stations and stops. No safety or security impacts to neighborhoods are anticipated under this alternative.

#### Traffic Increases

Increases in vehicle traffic surrounding stations and stops are analyzed in detail in Chapter 6. Higher traffic volumes are anticipated during peak hours, which could lead to higher incidences of vehicle and vehicle/pedestrian accidents compared to existing levels.

### Transit Vehicles

Operations of BRT vehicles would depend on vehicle type and final station design and will be discussed in detail in the *Transit Operations and Maintenance Plan*, June 2002, and in Chapter 6. Safety measures for the vehicles would be installed according to applicable regulations.

## 3.7.4.3 Metrorail Alternative

This alternative would create the same safety and security concerns as the current Metrorail system. These concerns include; fire, derailment, loss of power, flooding, structural collapse, hazardous materials incident, criminal acts, extreme weather, earthquake, or medical emergency.

### Stations

The safety and security concerns at stations include threats of personal crime, car theft or burglary, fire, and terrorism. New Metrorail stations including designated parking, Kiss & Ride, and pedestrian areas would be constructed with the same safety features as existing Metrorail stations. Transit areas would be signed and lighted for directing pedestrians and motorists to appropriate and safe areas. No additional effects to pedestrians or motorists are anticipated under this alternative.

**Height and Depth of Stations.** Stations under this alternative could be underground, aerial, and at ground level. Station heights could affect emergency response and fire evacuation. The maximum height of the evacuation walkway level of each of the aerial stations are as follows: 90 feet for Alignment T4, 65 feet for Alignments T1, T6, T9, and T9 Design Option. The maximum depth of the evacuation walkway in underground segments is 57 feet.

**Tysons Corner Pedestrian Access Across Arterials.** Improvements to crossings would be provided to intersections adjacent to the stations.

### Tracks

The third rail that provides power to the Metrorail cars poses a serious safety threat. However, no effects are anticipated along the alignment, as appropriate measures such as fencing and warning signs would be in place. As with the existing Metrorail system, the risk of passengers falling off station platforms and coming into contact with the track would be possible. However, as discussed, new Metrorail stations would have a safety zone under the platforms that provide safety for fallen passengers.

### Neighborhoods

No safety or security impacts are anticipated under this alternative.

### Vehicular Safety in Metro System Facilities

No additional safety effects are anticipated under this alternative. Vehicle and pedestrian safety in parking lots and roadways would be handled as in all Metro System facilities.

### Traffic Increase

Increases in vehicle traffic surrounding Metrorail stations are described in detail in Chapter 6. Higher traffic volumes are anticipated during peak hours, which could lead to higher incidences of vehicle and vehicle/pedestrian accidents.

**Transit Vehicle**

In emergency situations, the operation of Metrorail along the corridor would follow the existing plans and procedures found in WMATA's Standard Operating Plan. This plan provides procedures to prevent collisions with other Metrorail cars and disruptions in operations along the line or at stations.

Typically, if there is a problem along one track, Metrorail service is maintained by operating trains in both directions on the second track. Passengers would still have direct access to all stations along the line, because stations are served by two tracks. However, in the case of Alignment T4, four of the stations are only served by one track. If there were a problem along the north leg of Alignment T4, there would be no way of getting trains to the Tysons Central A and B stations. Likewise, Tysons Central C and D would be unreachable if there was a problem along the south leg of the alignment. In the first case, a passenger wishing to travel to Tysons Central A or B would need to get off the train at a nearby Tysons station and be bused to the vicinity of their original destination station.

#### 3.7.4.4 BRT/Metrorail Alternative

The long-term effects on safety and security from implementing the BRT/Metrorail Alternative between the existing Orange Line and Tysons Corner would be identical to those described in the Metrorail Alternative. West of Tysons West Station, the effects of the BRT/Metrorail Alternative would be identical to those of the BRT Alternative.

#### 3.7.4.5 Phased Implementation Alternative

Under the Phased Implementation Alternative, the final safety and security effects would be identical to those described for the Metrorail Alternative. Interim effects would be the same as the BRT Alternative during the period when BRT operates between the Orange Line and Loudoun County. These interim effects will change to those of the Metrorail Alternative as BRT service is first replaced from the Orange Line through Tysons Corner and then between Tysons Corner and Loudoun County.

### 3.7.5 CONSTRUCTION EFFECTS

This section outlines potential construction safety and security effects resulting from the proposed alternatives.

#### 3.7.5.1 Baseline Alternative

Under the Baseline Alternative there would be no construction-related safety and security effects from the Dulles Corridor Rapid Transit Project. However, there could be effects from the improvements assumed under this alternative. Identification of these effects would be the responsibility of the agencies and jurisdictions responsible for implementing the improvements.

#### 3.7.5.2 BRT Alternative

Some of the BRT stations and stops would include pedestrian bridges to span existing roadways. Because of their locations, safety concerns related to the construction of these stations, stops, and related facilities would include temporary closing of lanes on roadways and removal of shoulders. However, the operator would ensure that the effects are minimized by following applicable state and local codes as well as operator standards and would perform the work during off-peak hours to the extent possible. Traffic safety maintenance measures, such as signage, would be employed to minimize the effects. In addition, the operator would coordinate with applicable authorities including VDOT to ensure that affects related to construction on the roadways are minimized.

Other construction-related safety and security concerns include safety of the public and the construction workers in and around the construction areas. The operator would follow applicable state and local codes as well as the operator's standards such as erecting temporary construction fencing and providing the public with information regarding the construction activities to minimize potential effects.

#### 3.7.5.3 Metrorail Alternative

Construction of the Metrorail alignment and the stations and related facilities in the Tysons Corner area would have the potential for safety concerns because of the effects on the roadways and traffic from the construction activities. In addition, the Metrorail stations would be elevated or underground and some of the stations would include pedestrian bridges to span existing roadways. Because of their locations and designs, safety concerns related to the construction of the alignment, stations, and related facilities would include effects on the roadways and traffic from the construction activities. Similar to the BRT, for the Metrorail Alternative, the operator would follow the standard construction procedures to ensure that the effects from construction of the Metrorail Alternative are minimized.

#### 3.7.5.4 BRT/Metrorail Alternative

Construction-related effects from implementing the BRT/Metrorail Alternative from the existing Orange Line through Tysons Corner would be identical to those discussed in the Metrorail Alternative. Construction-related effects to safety and security from implementing the BRT/Metrorail Alternative west of Tysons Corner would be identical to those of the BRT Alternative.

#### 3.7.5.5 Phased Implementation Alternative

This alternative would involve the implementation of BRT and Metrorail over an extended period. Although the construction effects would be the same as those described above for the other alternatives, the timing would be different. The effects of constructing Metrorail through Tysons Corner would add to the effects of constructing BRT from the Orange Line to the end of the study area in Loudoun County. The effects of constructing Metrorail between Tysons Corner and Loudoun County would then follow those effects.

Because Phased Implementation might possibly include the demolition of the BRT ramps between the Tysons West Station and the DAAR and the Spring Hill Road BRT Station (for Alignment BRT 1 only), there would be other safety and security concerns in addition to those named above. Demolition of the ramps and station could affect traffic flow patterns. Construction and demolition areas would be fenced and WMATA construction methods and local building codes would be followed. Additional safety provisions applicable to specific construction sites would be determined during final design. Appropriate signing and safety measures would be installed to minimize these effects.

### 3.7.6 MITIGATION

This section discusses available strategies to mitigate any safety and security impacts caused by the Build Alternatives. Every effort would be made to keep the public notified of changes to current roadways. Regular public meetings and notifications including WMATA's Coordinated Safety Program and Strategic Marketing and Communications Public Involvement Program, would be used to promote public awareness and information.

### 3.7.6.1 DAAR and Dulles Airport

MWAA Police currently provide emergency response to Dulles Airport and access roads under four separate Mutual Aid Agreements: DAAR/Dulles Toll Road, Dulles Connector Road, Dulles Greenway, and Route 28. A similar Mutual Aid Agreement would need to be developed between WMATA, MWAA, Fairfax County, Loudoun County, Town of Herndon, and the Virginia State Police. MWAA Police have primary responsibility along the DAAR. The Virginia State Police and Fairfax County Police also operate along the DAAR.

The Dulles Toll Road was built on MWAA property by VDOT, and the Virginia State Police and Fairfax County Police have primary police responsibility. MWAA Police also operate along the Dulles Toll Road.

MWAA Fire and Rescue and Fairfax County have a Mutual Aid Agreement for emergency incidents along the DAAR from Dulles Airport to Reston Parkway. MWAA Fire and Rescue respond to emergency incidents in the DAAR west of Dulles Airport and east of Reston Parkway, and only in the eastbound direction. Fairfax County is responsible for incidents in all other areas. A similar agreement would need to be finalized prior to opening of any Build Alternative in the corridor.

Emergency response at stations proposed at Dulles Airport or along the DAAR, on airport property, would be subject to MWAA review, and MWAA standards for fire and life safety issues, regardless of existing Mutual Aid Agreements.

The agreement between MWAA and WMATA addresses the interoperability for Metrorail operations at the National Airport Station. This includes issues of policing and security measures, including possible terrorist activity. A similar agreement would be reached for transit operations at Dulles Airport. Because the Metrorail and Phased Implementation alternatives include an underground portion, which passes through the Dulles Airport restricted area; special attention would be given to the design of this portion of the alignment. No ventilation shafts would be located within the restricted zone. Emergency access to the underground portion of track within the restricted area would be coordinated with MWAA to determine how to keep the restricted area secure. Access by WMATA employees for routine maintenance and operations matters would be coordinated through the agreement reached by WMATA and MWAA to ensure that proper safety and security concerns are handled. Other safety and security measures such as tunnel access would be handled in the final design of the project in coordination with MWAA, FAA, and other agencies.

### 3.7.6.2 Construction

Construction impacts can be mitigated through the use of BMPs and by following WMATA's Construction Safety Methods Manual. Temporary construction fencing and watchmen could be used to protect the public and the work site from unauthorized entry of vehicles, adults, children, and animals. Temporary signage could be used to direct motorists and pedestrians around construction areas. Construction of the Metrorail Alternative through the airport restricted area most likely would be cut-and-cover construction. This activity will be coordinated between WMATA, MWAA, and the FAA to ensure that construction activity is conducted safely and that all security concerns are met.

### 3.7.6.3 Operations

Operational safety and security impacts can be mitigated by improved signal timing, improved pedestrian crossings, fencing, and signing. Implementation of the WMATA operations plan and the existing WMATA safety and security practices would improve the safety and security in the study area.

## 3.8 ENVIRONMENTAL JUSTICE

This section presents the environmental justice effects of the proposed Dulles Corridor Rapid Transit project.

### 3.8.1 LEGAL AND REGULATORY CONTEXT

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, directs federal agencies to "promote nondiscrimination in federal programs substantially affecting human health and the environment, and provide minority and low-income communities access to public information on, and an opportunity for public participation in, matters relating to human health or the environment." It also defines the terms "minority" and "low-income" in the context of environmental analysis.

The Council on Environmental Quality (CEQ) has oversight responsibility for and has written guidance regarding the federal government's compliance with Executive Order 12898 and the NEPA process. Likewise, the U.S. Department of Transportation (U.S. DOT) and the U.S. Environmental Protection Agency (EPA) have drafted guidelines to provide these agencies with guidance regarding compliance with environmental justice requirements.

### 3.8.2 METHODOLOGY

To assess potential environmental justice impacts, EPA guidance recommends that a screening first be performed to determine the location of potentially affected low-income and minority populations, followed by a determination of whether the possibility of disproportionate impacts exist. This section documents the process used to identify low-income and minority populations in relation to the corridor.

#### 3.8.2.1 Identifying Minority and Low-Income Populations

The study area defined for the Dulles Corridor Rapid Transit Project environmental justice evaluation extends 300 feet to either side of the proposed centerline of the project alternatives, expanded to a one-half mile radius at proposed station locations. This area was selected based on a review of the anticipated limit of disturbance of the proposed improvements. Furthermore, this area was checked against the results of noise, vibration, and air quality analysis to ensure that all potentially affected environmental justice populations are included in the analysis.

U.S. Census Bureau data were used to identify low-income and minority populations within the study area. Racial characteristic data at the Census block group level from the Census 2000 were used in the analysis. Census 2000 used new subcategories of minority groups. For the purpose of this analysis, these groups have been combined to be consistent with the racial groups described in Executive Order 12898.

No low-income data is currently available for Census 2000; therefore, to characterize low-income populations in the study area, population and income-level data from the 1990 Census was used.

Two threshold standards for identifying minority or low-income populations were developed for this project:

- Areas where 50 percent of the population of a Census block group (for minority populations) or Census tract (for low-income populations) is minority or living below the poverty level; or
- Areas where the minority or low-income population by Census block group or tracts, as appropriate, is at least 10 percent age points higher than the comparison population.

It should be noted that this methodology provides a broad assessment of locations where minority communities might potentially be located. It should not be interpreted that this methodology identifies all areas that meet the "greater than 10 percent" criteria as minority concentrations in and of themselves. The "greater than 10 percent" is used as a broad indicator that there is the potential that a minority or low-income community might be located within a larger Census block group or tract. The actual presence is determined by field investigation and coordination with local jurisdictions. This methodology has been used on several environmental justice analyses for transportation projects.

#### 3.8.2.2 Identifying Impacts Disproportionately Affecting Minority and Low-Income Populations

According to U.S. DOT Order 5680.1, a disproportionately high and adverse effect on minority or low-income populations is one that, "(1) is predominately borne by a minority or a low-income population, or (2) will be suffered by the minority population or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population or non-low income population."

### 3.8.3 EXISTING CONDITIONS

The analysis of environmental justice impacts for the project alternatives consists of a determination of whether environmental impacts identified in other sections of the Draft EIS constitute a disproportionate impact to minority or low-income persons.

The substantial impacts identified in this Draft EIS were analyzed to determine whether they would disproportionately affect minority or low-income populations. If no substantial impacts would occur, then there could not be substantial impacts that disproportionately affect minority or low-income populations. Benefits of the transit improvements to minority or low income populations are also identified.

The following sections identify the minority and low-income populations potentially affected by the project.

#### 3.8.3.1 Minority Populations

U.S. Census 2000 block groups with populations that are at least 50 percent minority or are at least 10 percent higher than the average for Fairfax and Loudoun counties are listed in Table 3.8-1. Six block groups met at least one of these thresholds. All six block groups and applicable neighborhoods are located in Fairfax County and are shown in Figure 3.8-1. No U.S. Census block groups that met the thresholds for identification as a minority population were found in the study area in Loudoun County. A summary of each block group is provided below.

**Table 3.8-1: Census Blocks That Meet Environmental Justice Thresholds**

| Tract/Block Group | Amer. Indian/ Alaskan Native | Black (not Hispanic origin) | Asian/ Pacific Islander | Hispanic | Total Minority |
|---|---:|---:|---:|---:|---:|
| 4712 BG3 | 0.0% | 3.1% | **24.6%** | 9.7% | 37.4% |
| 4811 BG1 | 0.1% | 12.8% | **24.4%** | 12.8% | **50.1%** |
| 4809 BG8 | 0.1% | 6.3% | 14.9% | **27.7%** | **49.0%** |
| 4809 BG9 | 0.2% | 9.1% | 12.1% | **30.7%** | **52.1%** |
| 4810 BG1 | 0.2% | 13.6% | 15.1% | **24.8%** | **53.7%** |
| 4825 BG8 | 0.2% | 10.2% | 15.1% | **20.5%** | **46.1%** |
| Fairfax County | 0.2% | 8.4% | 13.0% | 11.0% | 32.6% |

Percentages that meet minority thresholds are in bold.
Source: U.S. Census Bureau, GCT-PL: 2000 U.S. Census Race and Hispanic or Latino.

### Tract 4712, Block Group 3

This block group is located east of Tysons Corner, and is bordered by Dolley Madison Boulevard, I-495, Magarity Road, and the DAAR (within one-half mile of the Tysons East Station). This block group is largely comprised of multi-family residential neighborhoods including, the Commons of McLean townhouses, the Commons of McLean apartments, the Westerlies townhouses, and the Colonies at McLean condominiums.

This neighborhood meets the minority threshold because the percentage of Asians is higher than the average Asian population in all of Fairfax County.

### Tract 4811, Block Group 1

This block group is located on the south side of the DAAR between Monroe Street and Centreville Road. A small portion of the block group, containing the Woodland Park townhouse neighborhood (southwest of the intersection of Monroe Street and Sunrise Valley Road), is located in the study area (approximately one- half mile from the proposed Herndon-Monroe Station). This block group meets the minority threshold because the percentage of Asians is more over 10 percent higher than the Asian population for all of Fairfax County.

### Tract 4809, Block Group 8 and Block Group 9

These block groups are located on the north side of the DAAR and are bordered by Van Buren Street, Alabama Drive, and Centreville Road. The residential area within the half-mile radius of the proposed Herndon-Monroe Station is a portion of the Chandon Woods neighborhood. Chandon Woods is a residential neighborhood with townhouses and single-family homes. Both of these block groups meet the minority threshold because the Hispanic population is higher than the county as a whole or the total minority population exceeds 50 percent.

### Tract 4810, Block Group 1

This block group on the north side of the DAAR and is bordered by Elden Street, Loudoun County, and the Town of Herndon. A portion of the Reflection Lake neighborhood is within the one-half-mile radius of the proposed Herndon-Monroe Station. Reflection Lake is a neighborhood of townhouses and single-family homes. This block group meets the minority threshold because its total minority population is over 50 percent.

### Tract 4825, Block Group 8

This block group is located south of the DAAR, and is bordered by the Dulles Toll Road, Centreville Road, Sully Road, and Lee Highway. The residential portion of this block group that includes the Dulles Town Center complex is within the half-mile radius of the proposed Route 28 Station site. This block group meets the minority threshold because its Hispanic population and total minority population is higher than the minority population for Fairfax County as a whole.

## 3.8.4 LONG-TERM EFFECTS

This section includes a discussion of the potential disproportionate impacts to minority and low-income populations that would result from the project.

### 3.8.4.1 Baseline Alternative

Under the Baseline Alternative, the six minority block groups would not reap the benefit of the increased accessibility that transit improvements in the corridor would bring. In addition, there could also be effects from the improvements assumed under this alternative. However, identification of these effects would be the responsibility of the agencies and jurisdictions responsible for implementing the improvements.


LEGEND

| | |
|---|---|
| Census Tract 4811 Block Group 1 | County Boundary |
| Census Tract 4810 Block Group 1 | Neighborhoods |
| Census Tract 4809 Block Groups 8 & 9 | Existing Orange Line Metrorail and Stations |
| Census Tract 4825 Block Group 8 | |
| Census Tract 4712 Block Group 3 | |

0 1 2 3 MILES

Figure 3.8-1

# Environmental Justice Populations

Dulles Corridor
Rapid Transit Project

#### 3.8.4.2 BRT Alternative

The impacts of BRT alignments (BRT 1, BRT 2, and BRT 3) would be almost identical. The six minority block groups identified would benefit from the increased accessibility that all of the BRT alignments would provide. The BRT alignments are not predicted to result in substantial, adverse environmental impacts for the following topics, therefore no disproportionate impacts would occur:

- Population, employment, housing, and land use;
- Displacements and relocations;
- Neighborhoods, community cohesion, and community services;
- Cultural resources, parklands, and recreation areas;
- Safety and security;
- Geologic resources;
- Natural resources;
- Air quality;
- Vibration;
- Hazardous waste and contaminated material;
- Energy;
- Economic development; and
- Traffic.

Some noise, visual, economic development, and traffic impacts would occur as a result of all of the BRT alignments. However, none of the environmental justice populations would be disproportionately affected by any of these impacts.

#### 3.8.4.3 Metrorail Alternative

The six minority block groups identified would benefit from the increased accessibility that the Metrorail Alternative would provide. The Metrorail Alternative and all of its alignments in Tysons Corner are not predicted to result in substantial adverse impacts for the topics listed under the BRT Alternative, therefore no disproportionate impacts to the six minority block groups would occur:

- Population, employment, housing, and land use;
- Neighborhoods, community cohesion, and community services;
- Cultural resources;
- Parklands and recreation areas;
- Safety and security;
- Geologic resources;
- Natural resources;
- Air quality;
- Vibration;
- Hazardous waste and contaminated material;
- Energy;

- Economic development; and
- Traffic.

Some noise, visual impact, economic development and traffic impacts would occur as a result of the Metrorail Alternative and all four alignments through Tysons Corner. However, none of the environmental justice populations identified would be affected. Displacements and relocations would occur within Tysons Corner under the T1, T6, T9, the T9 Design Option, and T4 alignments. However, none of the environmental justice populations identified would be affected. Therefore, disproportionate effects would not occur.

#### 3.8.4.4 BRT/Metrorail Alternative

The effects of the BRT/Metrorail Alternative would be the same as those found using the BRT Alternative west of Tysons Corner, and the same as those found using the Metrorail Alternative from the existing Orange Line through Tysons Corner. As noted above for the BRT and Metrorail alternatives, the six minority block groups identified would benefit from the increased accessibility that the new transit improvements would provide. Metrorail would serve one of the six block groups; all of the others would be served by BRT. The difference in service would not result in disproportionate impacts.

#### 3.8.4.5 Phased Implementation Alternative

The effects of the Phased Implementation Alternative would be the same as those identified above for the Metrorail Alternative. No additional effects would occur as a result of implementing BRT first. The six minority block groups identified would benefit from the increased accessibility that the new transit improvements would provide. The difference in service as the different transit improvements are implemented over time would not result in disproportionate impacts.

### 3.8.5 CONSTRUCTION IMPACTS

This section includes a discussion of the potential disproportionate effects to minority and low-income populations that would result from construction the proposed alternatives.

#### 3.8.5.1 Baseline Alternative

Under the Baseline Alternative, there would be no effects from the Dulles Corridor Rapid Transit Project. However, construction-related impacts (and/or disproportionate effects) to the identified environmental justice populations could result from the improvements assumed under this alternative. Identification of these effects would be the responsibility of the agencies and jurisdictions responsible for implementing the improvements.

#### 3.8.5.2 BRT Alternative

Construction staging areas, which have not yet been identified, could result in short-term visual impacts along the BRT Alternative alignment. These staging areas would be placed to avoid disproportionately affecting any of the six minority block groups.

During construction, air quality impacts could occur, particularly around construction staging areas. It is not known where these impacts would occur or if they would disproportionately affect any of the six minority block groups.

#### 3.8.5.3 Metrorail Alternative

Construction staging areas, some of which have not been identified, could result in short-term visual impacts

along the Metrorail Alternative alignment. These staging areas would be placed to avoid disproportionately affecting any of the six minority block groups.

During construction, air quality and visual impacts could occur, particularly around construction staging areas. It is not known where these impacts would occur or if they would disproportionately affect any of the six minority block groups.

#### 3.8.5.4 BRT/Metrorail Alternative

Construction staging areas could result in short-term visual impacts along the BRT/Metrorail Alternative alignment. These staging areas would be placed to avoid disproportionately affecting any of the six minority block groups.

During construction, air quality, and visual impacts could occur, particularly around construction staging areas. It is not known where these impacts would occur or if they would disproportionately affect any of the six minority block groups.

#### 3.8.5.5 Phased Implementation Alternative

Construction of this alternative would involve the implementation of BRT and Metrorail over an extended period of time. Although the construction effects would be the same as those identified above for the other three alternatives, the timing would be different. The effects of constructing BRT from the Orange Line through Tysons Corner would add to the effects of constructing Metrorail through Tysons Corner. These effects would then be followed by the effects of constructing Metrorail from Tysons Corner to the end of the study area in Loudoun County. Disproportionate impacts to any of the six minority block groups are not anticipated.

### 3.8.6 MITIGATION

No mitigation is proposed, as no disproportionate impacts to the minority or low-income populations are anticipated.

### 3.8.7 SUMMARY OF ENVIRONMENTAL JUSTICE EFFECTS

A summary of the environmental justice effects described above is presented in Table 3.8-2.

**Table 3.8-2: Summary of Environmental Justice Effects**

| Alternative | Effect | Mitigation |
|---|---|---|
| Baseline | None | None |
| BRT | Benefits of increased transit access.<br>No disproportionate impacts. | None |
| BRT/Metrorail | Benefits of increased transit access.<br>No disproportionate impacts. | None |
| Metrorail | Benefits of increased transit access.<br>No disproportionate impacts. | None |
| Phased Implementation | Benefits of increased transit access.<br>No disproportionate impacts. | None |

### 3.8.8 PUBLIC INVOLVEMENT OUTREACH

Executive Order 12898 directs agencies to utilize existing law to ensure that they provide opportunities for community input in the NEPA process, including input on potential effects and mitigation measures. The public involvement program is discussed in Chapter 11.

Additional public outreach efforts included the addition of contacts within minority communities to the project mailing list: presidents of neighborhood associations, resident managers, property management companies, and neighborhood resource coordinators.

Significant outreach activities included mass distribution of flyers and newsletters throughout the corridor, speaking engagements, a project kiosk at Tysons Corner Center and a public information center in Reston, and special outreach at community events. Specific outreach focusing on minority populations within the corridor was conducted in advance of all public meetings.

Press releases announcing the July 25-27, 2000 public scoping meetings were sent to the following communications outlets directed toward minority populations in the Washington Metropolitan Region:

- Asian Fortune,
- El Tiempo Latino,
- Impacto (Latino),
- Iran Times,
- Pho No (Vietnamese),
- Washington Afro-American, and
- Washington Hispanic.

Press releases announcing January 30-February 1, 2001 public meetings were sent to the following communications outlets directed toward minority populations in the Washington Metropolitan Region:

- Asian Fortune,
- El Tiempo Latino,
- Impacto (Latino),
- Iran Times,
- Metro Herald (African American),
- Pho No (Vietnamese),
- Telemundo TV (Latino),
- Univision TV/ Radio News (Latino),
- Washington Afro-American,
- Washington Hispanic,
- WHUR FM (African American), and
- WKYS FM (African American).

Additional public outreach efforts included the addition of contacts within minority communities to the project mailing list: presidents of neighborhood associations, resident managers, property management companies, and neighborhood resource coordinators. This outreach effort will continue during the development of the Final EIS and design and construction phases of the project, once a locally preferred alternative has been selected.

# Environmental Effects 4

# 4 ENVIRONMENTAL EFFECTS

This chapter of the Draft EIS for the Dulles Corridor Rapid Transit Project describes the existing conditions of the natural and built environments. Project alternatives were then analyzed to determine the potential effects of each alternative upon the study area's natural resources, its habitats, and by-products of the built environment, such as noise, hazardous materials, and energy consumption.

Each section describes the study area defined for each topic, the methods used to make the assessments, and the existing conditions of each resource.

Study area definitions vary according to the topic being studied. For topics such as water resources and terrestrial biota and habitat, the study area is generally the limit of disturbance for the proposed improvements. For other topics the study area differs from the limit of disturbance. For example, with air quality there are actually two study areas. The first would encompass the entire Metropolitan Washington region and the second includes the areas immediately surrounding the proposed transit facilities where cars and buses would queue (e.g. intersections). Study areas are discussed below for each topic discussed. The sections also include, for each alternative, a discussion of the potential long-term effects, potential construction (short-term effects), effects, and when appropriate, the potential mitigation. Briefly, the sections of this chapter cover the following topics:

**Section 4.1 Geologic Resources.** This section provides a description of the geologic resources along and adjacent to the study area including the geology, topography, soils, prime farmlands, and groundwater of the Dulles Corridor.

**Section 4.2 Water Resources.** This section discusses the streams, floodplains, wetlands, and critical areas that make up the surface waters in the study area.

**Section 4.3 Aquatic Biota and Habitat.** Aquatic habitats could be protected under a variety of local, state and federal regulations that limit their use or destruction. This section examines the aquatic biota and habitat that exist in the study area.

**Section 4.4 Terrestrial Biota and Habitat.** Terrestrial habitats outside of private or public preserves, management areas, parks, or other legally protected areas have no special regulations limiting their use. However, plant and wildlife species within these areas are afforded legal protections. This section examines the terrestrial biota and habitat that exists in the study area.

**Section 4.5 Rare, Threatened, and Endangered Species.** Plant and animal species whose populations have declined to a point where extinction is imminent are afforded legal protection under federal and state laws. The U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) have authority to identify those species in danger of extinction and provide for their management and protection. The Virginia Department of Game and Inland Fisheries has adopted regulations protecting mollusks, fishes, amphibians, reptiles, birds, and mammals classified as endangered or threatened. This section identifies and

discusses plant or animal species that are classified as rare, threatened, or endangered by these agencies, and that exist in the study area.

**Section 4.6 Air Quality.** This section describes the air quality impact analysis conducted for the project. The potential air quality impacts of the project would be due to emissions from motor vehicle traffic associated with the project, and electric power generation to operate Metrorail trains.

**Section 4.7 Noise.** This section includes an introduction to basic noise concepts, including noise descriptors, the prediction methodologies and modeling assumptions used to analyze the noise impacts of the alternatives. The results of the ambient noise monitoring program and the evaluation of potential impacts of the alternatives along the Dulles Corridor are presented.

**Section 4.8 Vibration.** This section introduces some basic ground-borne vibration concepts, including the prediction methodologies and modeling assumptions. The results of the existing source vibration measurement program and the evaluation of potential impacts of the alternatives in the study area are presented.

**Section 4.9 Hazardous and Contaminated Materials.** This section describes the potential for discovering hazardous or contaminated materials during construction of the Dulles Corridor Rapid Transit Project, summarizes the extent of any suspected contamination and appropriate mitigation measures.

**Section 4.10 Energy.** This section presents the quantitative assessment of the impact of the project on transportation-related energy consumption in the study area. This analysis was conducted to assess the likelihood of substantial increases in energy consumption due to the project.

## 4.1 GEOLOGIC RESOURCES

This section describes the geologic resources along and adjacent to the study area and describes the anticipated effects that could result from the Dulles Corridor Rapid Transit Project. Geologic resources include geology, groundwater, topography, soils, and prime farmland. The proposed measures to mitigate the effects are also provided in this section. Geologic resources are also discussed in the *Natural Resources Technical Report* (June 2002).

### 4.1.1 LEGAL AND REGULATORY CONTEXT

Laws regarding sole source aquifers and prime farmlands are pertinent to defining geological resources. The Sole Source Aquifer Protection Program is authorized by the Safe Drinking Water Act of 1974. The Act was originally passed to protect public health by regulating the nation's public drinking water supply. It was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources—rivers, lakes, reservoirs, springs, and groundwater. Aquifers are designated as "Sole Source" to protect drinking water supplies in areas with few or no alternative sources of potable water.

The U.S. Department of Agriculture (USDA) defines prime farmland as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oil seed crops, and is also available for these uses. Prime farmland can be cropland, pastureland, forestland, or other land, but not urban built-up land or water. Land designated as "prime farmland" has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed according to acceptable farming methods.

The protection of prime farmland is promulgated under Title 7 of the United States Code, Chapter 73—the Farmland Protection Policy. The purpose of the policy is to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses, and to assure that federal programs are compatible with state, local, and private programs and policies to protect farmland.

### 4.1.2 METHODOLOGY

Research was the principal method used to gather information about the geologic resources within the study area in Fairfax and Loudoun counties. Geology, topography, and groundwater information was obtained from U.S. Geological Survey (USGS) maps and atlases. Soil and prime farmland data were compiled from the U.S. Environmental Protection Agency (EPA), the USDA, the Virginia Department of Health, and various local and regional sources. Additional information was obtained from websites, local and regional plans, project engineering studies and investigations, and personal communications with representatives from various federal, state, and local agencies. The study area for geologic resources was generally the Dulles Corridor, an area that extends from Route 7 to the north, I-66 to the south, a point beyond Route 772 in Loudoun County to the west, and a point beyond the city of Falls Church in Arlington County to the east.

### 4.1.3 EXISTING CONDITIONS

This section describes the existing conditions of the geologic resources underlying the study area.

#### 4.1.3.1 Geology And Topography

The study area is generally located in the Piedmont Physiographic Province, which lies between the Coastal Plain to the east and the Blue Ridge to the west. As shown on Figure 4.1-1, the Piedmont can be subdivided into the Piedmont upland and Piedmont or Triassic lowland. Crystalline metamorphic rocks such as schist, granite, gneiss, and greenstone of the late Precambrian or early Paleozoic age underlie the Piedmont upland. The Triassic lowland, also referred to as the Culpeper Basin, in western Fairfax County and eastern Loudoun County, begins approximately at Reston Parkway.

The lowland is an area of much younger, unmetamorphosed, red sedimentary rock (sandstone, siltstone, shale, and conglomerate), and igneous rock. Exposed igneous bedrock (diabase, diorite, and syenite) is present sporadically throughout the Triassic lowland. A horseshoe-shaped igneous intrusion crosses the study area just west of Reston. Another intrusion intersects the corridor at the northern end of Dulles Airport. Some of these intrusions, composed of diabase flat rock (a hard, dark-colored volcanic rock), are home to a community known as the diabase glade habitat. These communities are explained in detail in Section 4.5.

The Triassic lowlands range in elevation from approximately 250 feet to 400 feet above sea level. The lowlands slope toward the southwest because they are adjacent to the higher Piedmont uplands to the east. The Piedmont uplands range in elevation from 300 feet to 450 feet above sea level. Ground elevations of the study area gradually decline westward from Tysons Corner to Difficult Run, and then rise to 400 feet above sea level south of Sunset Hills Road. At the transition between the uplands and lowlands, the topography begins to flatten out, with elevations of approximately 380 feet above sea level. From the Dulles Airport Access Road (DAAR) and Route 28 interchange, the ground elevation declines to 250 feet above sea level and rises again to about 300 feet above sea level at the project terminus—Route 772 on the Dulles Greenway. Within Tysons Corner, ground elevations rise southward to approximately 450 feet above sea level. For soils, the study area was reduced to approximately the limit of disturbance.

### 4.1.3.2 Groundwater

This section describes the groundwater resources that underlie the study area.

#### Aquifers

Several types of aquifers underlie the Dulles Corridor. Crystalline-rock and undifferentiated sedimentary-rock aquifers underlie the Piedmont upland. This dense, almost impermeable bedrock yields water primarily from secondary porosity and permeability provided by fractures. Water moves from highland recharge areas to discharge areas (e.g., springs and streams) at lower altitudes. Groundwater levels measured during project geotechnical investigations at various locations within the study area indicated that ground water levels ranged from 23 to 34 feet below the ground surface in the vicinity of Tysons Corner and 14 to 17 feet below the ground surface between Reston and Loudoun County. Geotechnical borings drilled in Loudoun County did not encounter groundwater.

Water from aquifers underlying both topographic regions within the study area is suitable for drinking, but iron, manganese, and sulfate are often present at elevated concentrations in isolated areas.

#### Groundwater Wells

According to the Fairfax County Water Authority and the Loudoun County Sanitation Authority, the primary source of drinking water is surface water. However, people presently using groundwater wells that were in place prior to connection with central drinking water systems may not be connected to the central system. Although the Commonwealth of Virginia does not have an EPA-mandated or regulated wellhead protection program to protect these groundwater wells from contamination, the Commonwealth works with localities and waterworks via the Virginia Rural Water Association to educate and implement voluntary Wellhead Protection Programs. The Virginia Rural Water Association also coordinates the Source Water Assessment Program.

In accordance with the Source Water Assessment Program, the Virginia Department of Health performs vulnerability assessments of groundwater wells based on 1,000-foot fixed-radius zones. The two Fairfax County drinking water wells that fall within the 1,000-foot radius of the DAAR and Dulles Toll Road are located at the Hunter Mill Swim and Racquet Club and the Reston Presbyterian Church. In Loudoun County, two wells occur in the project area. One well is located west of the Loudoun/Fairfax county line and north of the Dulles Greenway. Another well is located southwest of the Dulles Greenway along the north side of Route 606.

#### Sole Source Aquifers

The nearest Sole Source Aquifers are the Maryland Piedmont Aquifer and Poolesville Area Aquifer. As indicated by EPA, Region III, these aquifers lie within the political and geographic jurisdictions of Frederick and Montgomery counties in Maryland. There are no sole source aquifers in Fairfax or Loudoun counties.

### 4.1.3.3 Soils

Soils within the study area vary according to the underlying geology—Piedmont Upland, Triassic Lowland, and Igneous Intrusion. Tables 4.1-1 and 4.1-2 list the soil types and various characteristics of each soil within the study area. Soils listed in Table 4.1-1 are arranged roughly from east to west as they occur along the corridor in Fairfax County. Table 4.1-2 lists the soils identified along the corridor in Loudoun County.

The proposed project alignment passes over igneous diabase intrusions west of Reston and at the northern end of Dulles Airport. The soils above this intrusion tend to be shallow (zero to 15 feet below ground surface) compared to those in the surrounding basin. These soils usually are nutrient-rich and have a seasonal perched

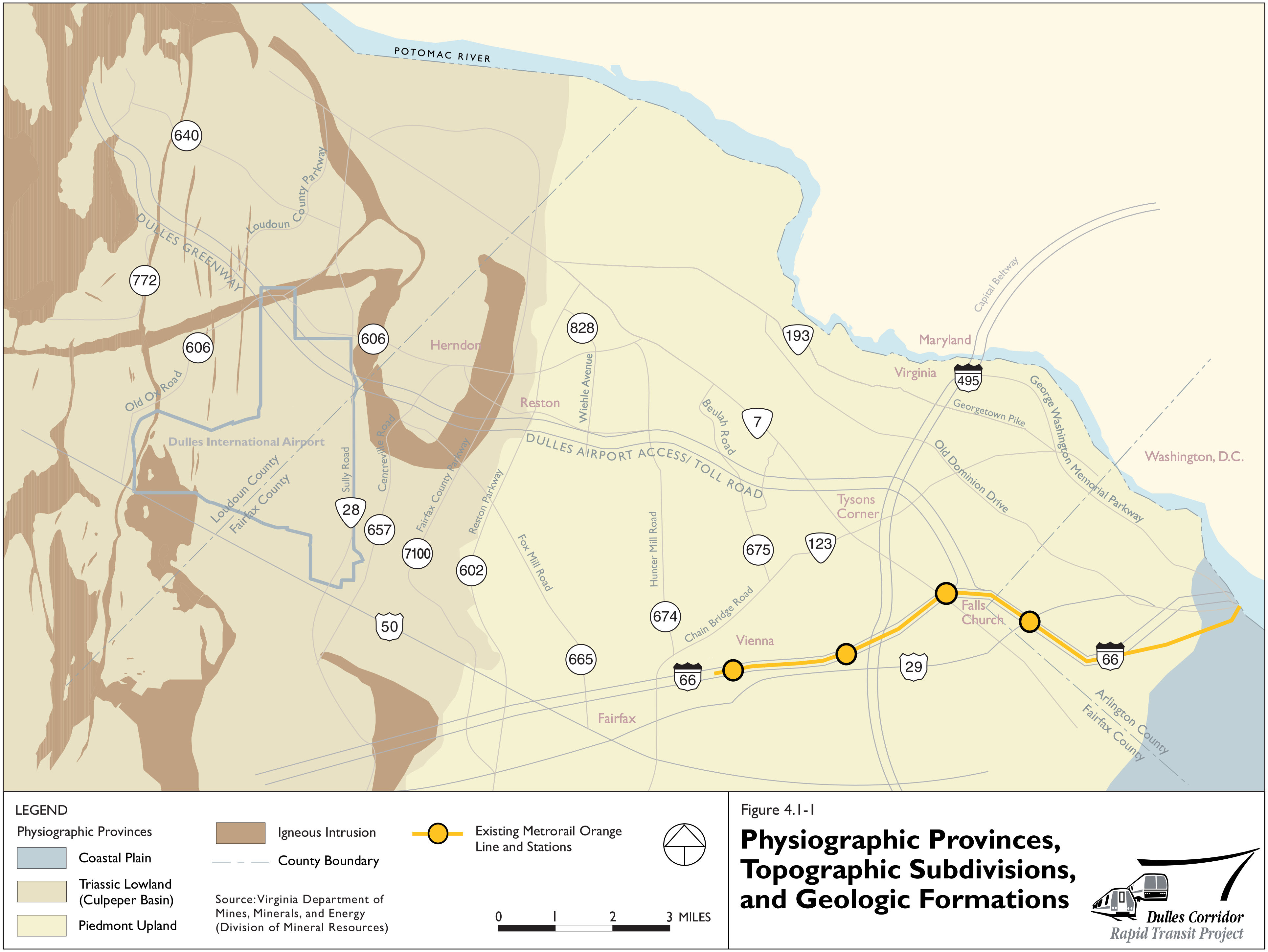



Figure 4.1-1

## Physiographic Provinces, Topographic Subdivisions, and Geologic Formations

water table from zero to 3.2 feet below ground surface. Most of the soils in this region belong to the Iredell soils group, a problematic soil that shrinks and swells depending on water content.

**Table 4.1-1: Study Area Soils – Fairfax County**

| Soil Name (Symbol) | Depth to Bedrock (Feet bgs) | Depth to Water Table (Inches) | Slope (%) | Soil Drainage | Shrink to Swell Potential |
|---|---|---|---|---|---|
| **Piedmont Upland** | | | | | |
| Mixed Alluvial Sand (Mr) | 3 to 30 | n.a. | 0-2 | Good | Variable |
| Masada gravelly loam, eroded rolling (Mg) | Alluvium on Terraces | 0 to 36+ | 7-14 | Good | Low |
| Glenelg silt loam, undulating* (Gb) | 5 to 100 | 2 to 72 | 2-7 | Good | Low |
| Glenville silt loam (Gg) | 10 to 100 | 0 to 27+ | 2-7 | Marginal to Poor | Low |
| Medowville silt loam** (Mp) | 10 to 100 | 0 to 48 | 2-7 | Good to Marginal | Low |
| Glenelg silt loam, eroded rolling (Gc) | 5 to 100 | 2 to 72 | 7-14 | Good | Low |
| Elioak silt loam, eroded undulating* (Eb) | 5 to 100 | 0 to 55 | 2-7 | Good | Low to Moderate |
| Worsham** (Wo) | 20 to 100 | 0 to 0.5 | 7-14 | Marginal | High |
| Manor silt loam, hilly (Mc) | 5 to 100 | 0 to 36 | 14-25 | Good | Low |
| Elioak silt loam, eroded rolling* (Ec) | 5 to 100 | 0 to 55 | 7-14 | Good | Low to Moderate |
| Glenelg silt loam, eroded hilly (Ge) | 5 to 100 | 2 to 72 | 14-25 | Good | Low |
| Lloyd** (Ld) | 4 to 30 | 2 to 72 | 7-14 | Marginal | Moderate to High |
| **Culpeper (Triassic) Basin prior to Igneous Intrusion** | | | | | |
| Chewacla silt loam** (Cg) | 10 to 20 | 2 to 48 | 0-2 | Marginal to Poor | Low |
| Calverton silt loam, undulating (Cc) | 3 to 8 | 0 to 37 | 2-7 | Marginal to Poor | Moderate to High |
| Mayodan silt loam, undulating (Mo) | 10 to 15 | 0 to 12 | 2-7 | Good to Marginal | Low to Moderate |
| Brecknock loam, undulating* (Bf) | 3 to 8 | 2 to 74 | 2-7 | Good to Marginal | Low |
| Rocky land, rolling basic rock** (Rc) | n.a. | 0 to 2 | 2-14 | Not Available | Variable |
| Bucks loam, undulating* (Bn) | 3 to 8 | 0 to 74 | 2-7 | Good | Low |
| **Igneous Intrusion within the Culpeper Basin** | | | | | |
| Iredell to Mecklenburg silt loams, eroded undulating** (Ib) | 0 to 15 | 0 to 32 | 2-7 | Marginal to Poor | High to very High |
| Elbert silt loam** (Ea) | 3 to 15 | 0 to 36 | 0-2 | Poor | High to very High |
| Very rocky land, rolling basic rock (Vb) | 0 to 15 | 0 to 2 | 2-25 | Not Available | Variable |
| Kelly silt loam, undulating (Ka) | 2 to 8 | 0 to 39 | 2-7 | Marginal to Poor | High to very High |
| Croton silt loam (Ck) | 3 to 8 | 0 to 34+ | 0-2 | Poor | Moderate to High |
| **Culpeper (Triassic) Basin after Igneous Intrusion** | | | | | |
| Penn silt loam, eroded rolling (Pn) | 3 to 5 | 0 to 19+ | 7-14 | Good to Excessive | Low |

| Soil Name (Symbol) | Depth to Bedrock (Feet bgs) | Depth to Water Table (Inches) | Slope (%) | Soil Drainage | Shrink to Swell Potential |
|---|---|---|---|---|---|
| Buck silt loam, eroded undulating* (Bo) | 3 to 8 | 0 to 55 | 2-7 | Good | Moderate |
| Manassas silt loam* (Ma) | 3 to 8 | 0 to 36 | 2-7 | Good to Moderate | Low |
| Calverton loam, undulating (Ca) | 3 to 8 | 0 to 37 | 2-7 | Marginal to Poor | Moderate |
| Brecknock silt loam, eroded undulating* (Bh) | 3 to 8 | 2 to 24 | 2-7 | Good to Marginal | Low |

*Prime Farmland Soils for Fairfax County – from NASIS database. http://nasis.nrcs.usda.gov/documents/help/NASIS_da.htm.
**Hydric Soil or contains hydric inclusions.
bgs = Below Ground Surface

**Table 4.1-2: Study Area Soils – Loudoun County**

| Soil Name | Depth to Bedrock (Feet bgs) | Depth to Water Table | Slope (%) | Soil Drainage | Shrink to Swell Potential |
|---|---|---|---|---|---|
| Rowland silt loam** | Greater than 6 | Seasonal | 0-3 | Moderate to Poor | n.a. |
| Bowmansville silt loam | Greater than 6 | Seasonal | 0-3 | Poor | n.a. |
| Manassas silt loam | Greater than 5 | Perched | 1-8 | Fair | n.a. |
| Panorama silt loam* | Greater than 6 | None | 3-8 | Good | n.a. |
| Ashburn silt loam | 20 to 40 | Seasonal | 1-8 | Fair | n.a. |
| Albano silt loam | 40 to 60 | Seasonal | 0-3 | Poor | n.a. |
| Dulles silt loam | 40 to 60 | Seasonal | 0-3 | Fair to Moderate | n.a. |
| Nestoria gravelly silt loam** | Greater than 4 | Seasonal | 8-15 | Well | n.a. |
| Penn silt loam | 20 to 40 | None | 3-8 | Fair | Low |
| Haymarket | Greater than 5 | Perched | 2-8 | Good | High |

*Prime Farmland
** Hydric Soils and soils containing hydric inclusions
bgs = Below Ground Surface
n.a.= not available

Within the Piedmont Upland, areas of greenstone bedrock underlying the Lloyd, Orange, and Rocky Land soil types could contain naturally occurring fibrous asbestos minerals. Figure 4.1-2 shows the approximate location of these soil types in the study area. For more information about the potential hazards of these soils refer to Section 4.9.

### 4.1.3.4 Prime Farmland

Most of the study area is located within Fairfax County, which is highly urbanized and densely populated. Consequently, prime farmland soils in the study area have been developed into residential neighborhoods or commercial centers. Loudoun County, in contrast, is a mix of suburban and rural development. Data obtained from the Loudoun County Office of Mapping and Geographic Information indicates that three areas of prime farmland exist in proximity to the proposed alignment in Loudoun County. Coordination with the Natural Resources Conservation Service (NRCS) confirmed these areas and the soil types that are considered prime for farmland. The prime soil type in these three areas is Panorama silt loam. It is a deep, well-drained, reddish-brown silt developed from fluvium. Locations of these areas are depicted in Figure 4.1-3.


LEGEND

Soil Type

- Lloyd
- Orange
- Rocky Land

Existing Metrorail Orange Line and Stations

County Boundary

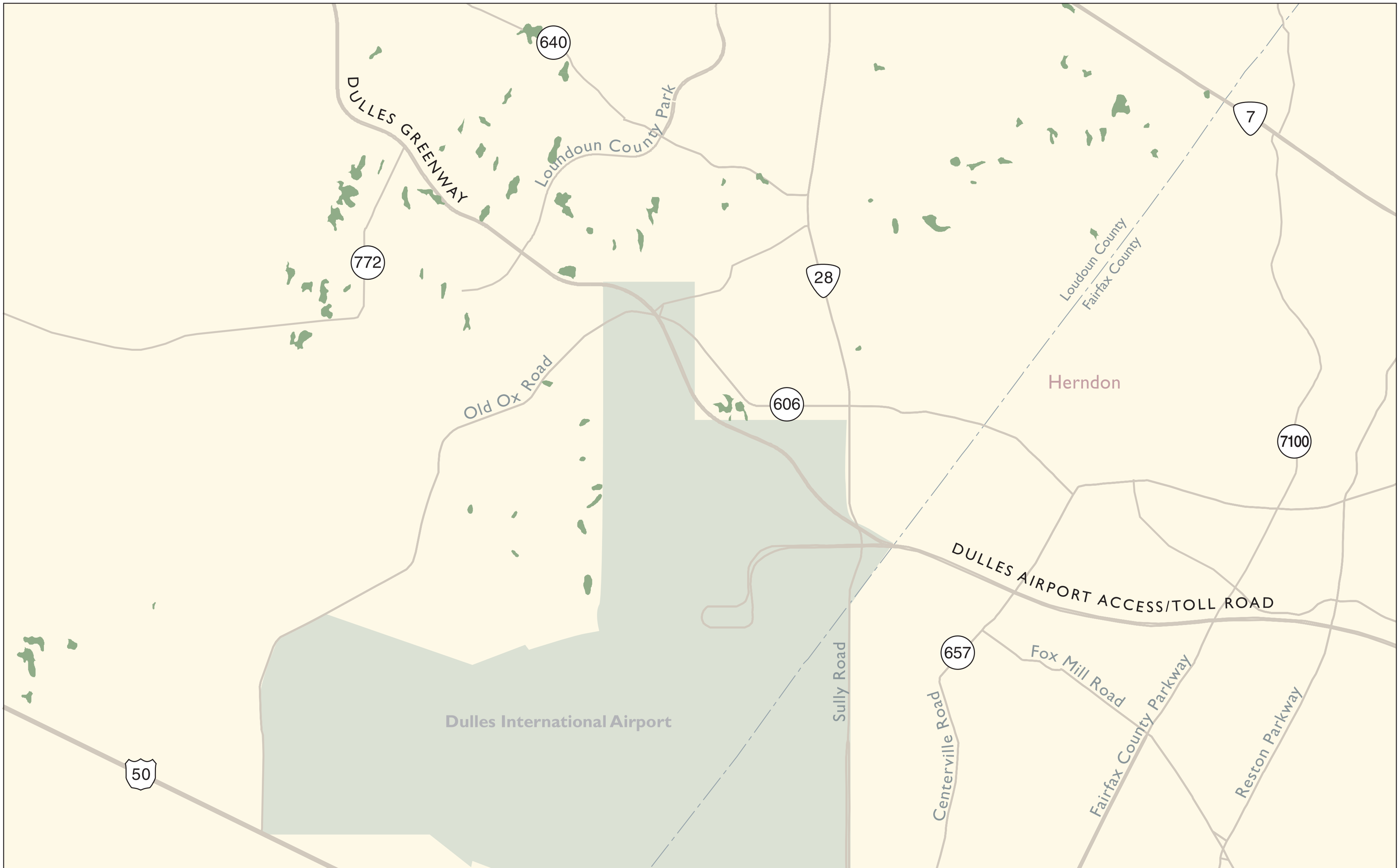
Source: Loudoun County Office of Mapping and Geographic Information

0 1 2 3 MILES

Figure 4.1-2

# Soils Potentially Containing Fibrous Asbestos Minerals

Dulles Corridor Rapid Transit Project




LEGEND

Prime Farmland

County Boundary

Source: Loudoun County Office of Mapping and Geographic Information

0 3000 6000 FEET

Figure 4.1-3

# Prime Farmland
# Loudoun County

Dulles Corridor
Rapid Transit Project

### 4.1.4 LONG-TERM EFFECTS

The following sections describe potential long-term effects of the Baseline Alternative and four Build Alternatives on the geologic resources that underlie the study area.

#### 4.1.4.1 Baseline Alternative

Under the Baseline Alternative, there would be no effects to geologic resources from the Dulles Corridor Rapid Transit Project. However, there could be effects from the improvements assumed under this alternative. Identification of these effects is the responsibility of the agencies and jurisdictions responsible for the improvements.

#### 4.1.4.2 BRT Alternative

Effects to geologic resources as a result of this alternative and its alignment options are expected to be minimal. The long-term effects to geologic resources from the BRT Alternative are described below. The effects of Alignments BRT 2 and BRT 3 would be almost identical to those of Alignment BRT 1. Differences are noted below.

**Geology and Topography**

Minor effects on the geology or topography within the study area are expected with the BRT Alternative.

**Groundwater**

The BRT Alternative could affect groundwater quality. Minor amounts of direct contamination could be associated with incidental losses of grease, fluids, oils, and other contaminants that escape secondary containment systems during BRT operations and at the Maintenance and Storage Facility. Although most of the fugitive contaminants would be carried to appropriate containment, recycling, and disposal facilities, small amounts could settle out and enter the groundwater system.

The BRT Alternative would result in a small increase in impervious surfaces in the area of the BRT stations and associated facilities. This would have a minor effect on the recharge capacity of local aquifers.

The stormwater management facilities proposed at various stations and at the BRT Maintenance and Storage Facility would create new sources of groundwater recharge. These increases would likely occur only in the vicinity of the facilities.

BRT vehicles would operate in the existing lanes of the DAAR in the vicinity of the source water protection wells located within 1,000 feet of the DAAR. The closest station facilities to these wells would be located at Wiehle Avenue (BRT 1 and BRT 2), approximately 6,300 feet away. Therefore, there would be no effect to the wells.

**Sole Source Aquifers.** There are no sole source aquifers in Fairfax or Loudoun counties. Therefore, the BRT alignments would have no long-term effects on this resource.

**Soils**

No long-term effects on project corridor soils are expected as a result of implementing the BRT alignments. Areas with asbestos-containing soils or soils with high potential for shrink-swell are not expected to be encountered during construction of the stations, stops, or ancillary facilities.

### Prime Farmland

Construction of the BRT Maintenance and Storage Facility and Route 772 Stop proposed for all three BRT alignments (if constructed on the south side of Route 772) would affect several small non-contiguous parcels of prime farmland. However, according to the *Loudoun County Revised General Plan* and the *Toll Road Plan*, the land use in these areas is intended to support "keynote employment" and business employment or residences, respectively. Under these non-agricultural land use plans, the prime farmland at issue would ultimately be converted to urban uses regardless of the implementation of the BRT Alternative.

## 4.1.4.3 Metrorail Alternative

The following section describes the long-term effects of implementing Metrorail Alternative.

### Geology and Topography

Minor long-term effects on the geology or topography within the study area are expected from the Metrorail Alternative. Tunneling at underground segments and pier and pile construction for the support of aerial structures would first be examined through geotechnical investigations and subsurface studies at specific locations.

### Groundwater

The Metrorail Alternative would result in a small increase in impervious surface. This would have a minor effect on the groundwater recharge capacity of local aquifers. This effect would be partially offset by the increased aquifer recharge that would occur as a result of the proposed stormwater management facilities.

Because the Metrorail Alternative could involve construction of underground sections of alignment (Tysons Corner Alignment T1, T6, T9, or T9 Design Option and Dulles Airport), minor impacts to groundwater quality, temporary groundwater depletion, and/or stormwater discharge could occur. If rainwater or other water seepage collects in the tunnels during construction, a NPDES and Virginia Water Protection Permit would be required to discharge this water.

### Soils

No long-term effects on the soils of the project corridor are expected from the Metrorail Alternative. It is not anticipated that problem soils such as those containing asbestos or those with the propensity to shrink and swell would be encountered.

### Prime Farmland

Construction of the Route 772 Station (if constructed on the south side of Route 772) would affect several small, non-contiguous parcels of prime farmland. However, as discussed above for the BRT Alternative, these areas (according to the *Loudoun County Revised General Plan*) are likely to be converted to urban uses regardless of the implementation of the Metrorail Alternative. Proposed Metrorail S&I Yards 7 and 15 would also affect small, non-contiguous parcels of prime farmland. Information obtained from MWAA's Airport Land Use Plan shows that the land use for Site 15 is slated as an airport buffer zone. Prime farmland soils at Sites 7 and 15 would not be usable as farmland because of their small size and isolated nature. Additionally, these sites are not presently used as agricultural land and would likely be converted to urban uses regardless of the implementation of the Build Alternatives. There are no impacts to prime farmland at Site 20 because prime farmland soils are not present.

#### 4.1.4.4 BRT/Metrorail Alternative

The BRT/Metrorail Alternative effects between the existing Orange Line and Tysons Corner would be identical to those discussed above under the Metrorail Alternative. The effects of BRT in the remainder of the corridor (west of Tysons Corner) are detailed above under the BRT Alternative.

#### 4.1.4.5 Phased Implementation Alternative

Under the Phased Implementation Alternative, effects to geologic resources would be the same as those identified above for the Metrorail Alternative with the following additional effects. Minor additional effects to topography and soils would occur as a result of constructing the BRT Maintenance and Storage Facility at either Site 14 or Site 20, the Spring Hill Road Station (BRT 1 alignment only), and the ramps from the DAAR to the Tysons West Station.

### 4.1.5 CONSTRUCTION EFFECTS

The following sections describe potential construction effects of the Baseline and Build alternatives on the geologic resources that underlie the study area.

#### 4.1.5.1 Baseline Alternative

Under the Baseline Alternative, there would be no construction-related effects to geologic resources from the Dulles Corridor Rapid Transit Project. However, there could be construction-related effects from the improvements assumed under this alternative. Identification of those effects is the responsibility of the agencies and jurisdictions implementing the improvements.

#### 4.1.5.2 BRT Alternative

The BRT Alternative would involve construction of stations, stops, and ancillary facilities; site development of the BRT Maintenance and Storage Facility; and minor roadwork. The following sections describe the effects of constructing the BRT Alternative. The construction effects of the three BRT Alignments would be identical.

##### Geology and Topography

The construction actions for the BRT Alternative would not require large amounts of excavation or filling. Thus, only minimal effects on the existing topography and no effect to geology would be anticipated.

##### Groundwater

Some minor effects to groundwater quality could occur during construction of the stations, stops, and the BRT Maintenance and Storage Facility. Minor amounts of direct contamination could be associated with incidental losses of grease, fluids, oils, and other contaminants that escape secondary containment systems during construction. Although most of the fugitive contaminants would be carried to appropriate containment and disposal facilities, small amounts could settle out and enter the groundwater system.

##### Soils

Almost all of the native soils within the study area have been disturbed by construction of the DAAR and Dulles Toll Road, as well as during development of the surrounding area. Constructing the BRT Alternative would require cutting, grading, and filling in certain sections of the existing corridor for station and stop sites and a maintenance and storage facility. However, most of this work would occur in areas where soils have been previously disturbed. The BRT alignments are not expected to affect adjacent building foundations.

During construction, the possibility exists of exposing soils overlying greenstone bedrock, which could contain fibrous asbestos minerals in areas depicted in Figure 4.1-2. These fibers could become airborne during excavation operations and other construction activities that involve soil work. Based on directives from the Fairfax County Health Department, before beginning construction in areas with asbestos-containing soils, a compliance plan must be prepared and submitted to the Fairfax County Health Department for review and approval.

#### Prime Farmland

No construction effects on prime farmland are expected from the BRT Alternative.

### 4.1.5.3 Metrorail Alternative

The Metrorail Alternative would involve building stations and aerial structures, site development for the Metrorail S&I Yard, and tunneling at Tysons Corner (Alignments T1, T6, T9, and T9 Design Option) and Dulles Airport. The following sections describe the construction effects of implementing the Metrorail Alternative.

#### Geology and Topography

Potential construction effects of the Metrorail Alternative on the geology and topography underlying the study area would be associated with the following activities: leveling for the tracks, mostly in the median of the DAAR; clearing, grubbing, and leveling for the Metrorail S&I Yard; constructing new embankments or altering existing embankments at bridge and tunnel approaches; drilling piers and piles for aerial structures, and possible tunneling in Tysons Corner and at Dulles Airport.

Surface excavations, cut-and-cover tunneling, hill cuts, and pile driving would be the most intrusive construction methods. Unless Alternative T1, T6, T9, or T9 Design Option is selected, construction techniques and related development actions associated with the Metrorail Alternative would require little excavation or filling. No construction effects on the existing geology and topography in the area would be anticipated. With Alignment T1, T9 and T9 Design Option, minor short-term impacts would be anticipated, while slightly more short-term impacts would be anticipated with Alternative T6.

In preliminary evaluations of subsurface conditions along the proposed alignments (refer to *Natural Resources Technical Report* June 2002), the following were considered: soil and rock engineering properties, shallow foundations, support of abutments and aerial structures with piles, support of aerial structures with drilled shafts, methods of tunnel construction, design of retaining walls, dewatering, temporary excavation support, and various other construction considerations. Future studies, including subsurface investigations at specific structure locations (e.g., piers, transit stations, tunnel segments, etc.) would be conducted as part of the design process. These studies would provide contractors with more information to implement Best Management Practices (BMPs) for subsurface conditions at specific areas during intrusive activity, thereby minimizing any short-term impacts to geologic structures during project construction.

#### Groundwater

Minor amounts of direct contamination would potentially be associated with incidental losses of fugitive grease, fluids, oils, and other contaminants that escape secondary containment systems during construction activities. Although most of the fugitive contaminants would be carried to appropriate containment, recycling, and disposal facilities, small amounts could potentially settle out and enter the groundwater system.

Because the Metrorail Alternative could involve construction of underground segments of the alignment (Tysons Corner Alignments T1, T6, T9, or T9 Design Option and Dulles Airport), minor impacts to groundwater quality, temporary groundwater depletion, and/or stormwater discharge could occur. Alignment T4 would have fewer short-term impacts on groundwater than the other three potential alignments because Alignment T4 is primarily aerial with the exception of support piers. Completing preliminary geotechnical investigations would minimize potential groundwater effects. Field pump tests would be conducted periodically along tunnel alignments to determine the effectiveness of the dewatering systems that would be used during construction.

Excavation for retained fill sections for the stations, and cut sections for tunneling could encounter groundwater, but short-term effects are expected to be minimal. During construction of stations and tunnel sections where groundwater could be encountered, wells can be constructed and groundwater pumped out for the purpose of depressing groundwater elevations in the vicinity of the work. The ultimate tunnel sections would be waterproofed to inhibit the flow of groundwater into the tunnel after construction. Groundwater elevations are expected to return to preconstruction levels when tunnel construction is complete.

During construction of an underground station associated with Tysons Corner Alignment T6 and underground segments of the line in Tysons Corner (T1, T6, T9, and T9 Design Option) and Dulles Airport, rainwater and other water seepage could collect in the tunnels. National Pollutant Discharge Elimination System (NPDES) and Virginia Water Protection permits would be required to discharge this water.

#### Soils

Land disturbance would be limited during construction of the stations, walkways, aerial sections of Metrorail, and minor roadwork. More extensive earth removal would be associated with the proposed underground segment in Tysons Corner required for Alignments T1, T6, T9, or T9 Design Option and the underground section at Dulles Airport. However, these disturbances would be minimal and temporary, as well as consistent with those of the surrounding development.

Some soils within the corridor have characteristics that would need to be considered as part of design and construction. As discussed in Section 4.1.3.3, several soil types have moderate to poor drainage, a high to very high shrink-swell potential, and/or a high water table. In addition, some soils on steep slopes have high erosion potentials. There is also a possibility of exposing soils overlying greenstone bedrock that could contain fibrous asbestos minerals.

#### Prime Farmland

No construction effects to prime farmland are expected from implementing the Metrorail Alternative.

### 4.1.5.4 BRT/Metrorail Alternative

The construction effects of the BRT/Metrorail Alternative would be identical to the Metrorail Alternative construction effects discussed above, except that the BRT/Metrorail Alternative would not involve underground construction at Dulles Airport.

### 4.1.5.5 Phased Implementation Alternative

Construction of this alternative would involve the implementation of BRT and Metrorail over an extended period of time. Although the construction effects would be the same as those identified for the other three Build Alternatives, the timing would be different. The effects of constructing BRT between the Orange Line and Loudoun County would be added to the effects of constructing Metrorail through Tysons Corner. These

effects would then be followed by the effects of constructing Metrorail from Tysons Corner to the terminus of the study area in Loudoun County.

### 4.1.6 MITIGATION

During the construction of stations and stops, site development of the BRT Maintenance and Storage Facility, site development of the Metrorail S&I Yard, and minor roadwork, BMPs identified in relevant state and local regulations would be used to mitigate potential impacts on the groundwater resources underlying the project corridor. The Commonwealth of Virginia has established soil and water conservation districts for the conservation of soil resources, and the control and prevention of soil erosion and non-point pollution. An erosion and sediment control plan would be submitted to the district jurisdiction and approved prior to engaging in any land-disturbing activity.

Requirements of BMPs typically address education programs, stormwater management, pollution control devices, spill prevention programs, installation and maintenance of runoff diversion structures and secondary containment structures, and other sediment and erosion control measures. Depending on the site, site-specific permit requirements could supercede BMPs.

During soil disturbance activities in areas with Lloyd, Orange, and Rocky Land soil types (see Figure 4.1-2), there is a possibility of exposing soils overlying greenstone bedrock, which could contain fibrous asbestos minerals. The fibers could become airborne during excavation operations. Based on directives from the Fairfax County Health Department, prior to implementing construction activities in areas with potential asbestos-containing soils, a compliance plan would be prepared and submitted to the Fairfax County Health Department for review and approval. The compliance plan would address standard operating procedures, dust control, air monitoring, disposal of removed asbestos-containing soils, and capping exposed areas of asbestos-containing soils. Worker protection measures are also required.

For tunnel construction, appropriate geotechnical studies and test programs would be conducted as part of detailed design.

### 4.1.7 SUMMARY OF EFFECTS

A summary of the effects to geologic resources is presented in Table 4.1-3.

**Table 4.1-3: Summary of Geologic Resources Effects**

| Alternative | Groundwater | Soils | Prime Farmland | Mitigation |
|---|---|---|---|---|
| Baseline | None | None | None | None |
| BRT | Minor potential for contamination | Minor (Grading) | None | Develop erosion and sediment control plan, BMPs<br>Develop compliance plan for potential asbestos-containing soils |
| BRT/Metrorail | Minor potential for contamination | Minor (Grading) | None | Develop erosion and sediment control plan, BMPs<br>Develop compliance plan for potential asbestos-containing soils |
| Metrorail | Minor potential for contamination | Minor (Grading) | None | Develop erosion and sediment control plan, BMPs<br>Develop compliance plan for potential asbestos-containing soils |
| Phased Implementation | Minor potential for contamination | Minor (Grading) | None | Develop erosion and sediment control plan, BMPs<br>Develop compliance plan for potential asbestos-containing soils |

## 4.2 WATER RESOURCES

This section describes the water resources within the Dulles Corridor, including surface water (e.g., streams), wetland systems, and floodplains, as well as critical areas such as Chesapeake Bay Protection Areas, environmental quality corridors, and river and stream corridor overlay districts. The effects upon these resources that could result from the project are described, as well as the proposed measures to mitigate the effects.

### 4.2.1 LEGAL AND REGULATORY CONTEXT

Sections 401 and 402 of the Clean Water Act mandate that state and federal water quality standards be met for activities that result in the discharge of materials to "Waters of the U.S." Section 401 of the CWA requires that anyone intending to discharge dredge material or fill in a waterway or wetland obtain a 401 Certification. This Certification assures compliance with the Virginia Water Quality Standards. The U.S. Army Corps of Engineers (USACE), in accordance with Executive Order 11990, "Protection of Wetlands," and Section 404 of the Clean Water Act regulate the "Waters of the U.S.," which include wetlands.

Section 9 of the Virginia Administrative Code (VAC) 25-210 contains the Virginia Water Protection Permit Program Regulations. These regulations address wetland protection through the Commonwealth. They are similar to those described under the Clean Water Act, which delegates that each state has a water/wetland protection program. Section 9 VAC 25-210 reflects the Commonwealth's implementation of the Clean Water Act.

EPA's total maximum daily load (TMDL) program provides guidelines for identifying impaired waters and determining pollution sources. A TMDL is the amount of pollutant that a waterbody can assimilate without causing violation of a numeric water quality standard. Section 303(d) of the Clean Water Act requires each state to identify surface waters that do not meet water quality standards. Impaired surface waters are placed on a 303(d) list, termed the TMDL Priority List, for a specific pollutant and could be listed multiple times for different pollutants.

Pursuant to Section 402 of the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) and the Virginia Pollutant Discharge Elimination System (VPDES) require a permit for all construction activities that will result in the disturbance of five or more acres of the total land area, including areas that are part of a larger common plan or development. Pursuant to the Rivers and Harbors Act of 1899, activities affecting navigable waters of the U.S. are also regulated by USACE. Activities regulated under Section 10 include the construction of structures in, under, and over navigable waters, as well as the excavation and deposition of material in navigable waters.

Executive Order 11988, "Floodplain Management," and U.S. Department of Transportation (U.S. DOT) Order 5650.2, "Floodplain Management and Protection" prescribe policies and procedures for the avoidance and mitigation of floodplain impacts. In addition, the Virginia Department of Environmental Quality (VDEQ), and Loudoun County have developed floodplain management measures pursuant to stormwater management ordinances. Fairfax County's floodplain management measures are contained in the County's Zoning Ordinance.

The Chesapeake Bay Preservation Act establishes criteria for use by Fairfax County to designate Chesapeake Bay Preservation Areas within their jurisdictions.

The National Wild and Scenic Rivers Act of 1968, as amended, was enacted to preserve certain rivers with exemplary natural, cultural, or recreational features in a free-flowing condition, and to protect them for the benefit and enjoyment of present and future generations. The Commonwealth of Virginia Scenic Rivers Act affords protection to waters of statewide importance. There are no federal Wild and Scenic Rivers or State Scenic Rivers in or near the study area.

The Federal Aviation Administration's (FAA) Advisory Circular No. 150/5200-33 recommends limiting wildlife use of wet areas within an airport's approach or departure airspace, aircraft movement areas, loading ramps, or aircraft parking areas because they may cause conditions that are hazardous to aircraft safety. Human-made or natural areas, such as poorly drained areas, retention ponds, and wetland systems provide a habitat for wildlife.

### 4.2.2 METHODOLOGY

The study area for natural resources was determined as a 600-foot-wide corridor that included the Dulles Connector Road, DAAR, and Dulles Greenway, expanded to widths of 800 to 2,000 feet depending on the proposed facilities. The study area was delineated based on the potential for disturbance from all conceivable project facilities.

As required by the Clean Water Act, VDEQ conducted extensive monitoring of ambient water quality parameters within Virginia's surface waters. VDEQ and the Virginia Department of Conservation and Recreation (VDCR) reported the results of this monitoring effort in the *Virginia Water Quality Assessment 1998 305(b) Report* prepared for EPA. The results of this investigation, in conjunction with sampling conducted by VDEQ in January 1999, were used to establish baseline conditions for the streams bisecting the study area.

Wetland systems within the Dulles Corridor were identified prior to field reconnaissance using U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) maps and USGS topographic maps. Flood Insurance Rate Maps (FIRM) produced by the Federal Emergency Management Agency (FEMA) were used to identify the 100-year floodplains as well as other regulatory floodways. The NRCS Soil Survey Reports for Fairfax and Loudoun counties were also used to locate riverine systems. Wetland systems within the study area were delineated between December 2000 and March 2001. Additional delineations were conducted in September 2001 for the Herndon-Monroe park-and-ride facilities.

The 1987 Corps of Engineers *Wetland Delineation Manual* was used to determine which areas met the federal criteria for wetlands, including hydrophytic vegetation, hydric soils, and wetland hydrology. The functions and values of each wetland system were evaluated using *The Highway Methodology Workbook Supplement-Wetland Functions and Values: A Descriptive Approach* (i.e., the New England method). A confirmation of the jurisdictional determination by the USACE was issued on March 22, 2002 (see Appendix F). This confirmation is valid for a period of five years, unless new information warrants revisions.

The project team documented the potential effects of the project on natural resources (including water resources) in the *Natural Resources Technical Report* (June 2002).

### 4.2.3 EXISTING CONDITIONS

Surface water resources, water quality, wetland systems, floodplains, and critical areas in the study area are

discussed below. For ease of discussion, these resources are described as they occur in five geographic sections of the study area, running from east to west. Groundwater resources are discussed in Section 4.1.

#### 4.2.3.1 Surface Water Resources

The Dulles Corridor is located entirely within the Potomac-Shenandoah River Basin, which is separated into two USGS hydrologic units designated as the Middle Potomac-Catoctin and the Middle Potomac-Anacostia-Occoquan watersheds. A hydrologic unit or watershed is a geographic area representing part or all of a surface drainage basin, a combination of drainage basins, or a distinct hydrologic feature.

As shown in Figure 4.2-1, the corridor traverses the drainage divide between the two watersheds, with most of the streams in the Dulles Corridor draining to the Middle Potomac-Catoctin watershed. The Middle Potomac-Anacostia-Occoquan watershed lies within eastern portions of the Dulles Corridor.

Figure 4.2-1 also shows that the Dulles Corridor extending across the upper and middle portions of six smaller watersheds (Pimmit Run, Scotts Run, Difficult Run, Sugarland Run, Horsepen Run, and Broad Run). The smaller first-order streams range in size from two feet to five feet wide with an average channel depth of three feet. Larger second-order streams include Pimmit Run, Scotts Run, Courthouse Spring Branch, Wolftrap Creek, Difficult Run, Sugarland Run, Indian Creek, Horsepen Run, and Broad Run, where two first-order streams meet, a larger second-order stream is created. The average channel width of these streams is 20 feet with a depth of five feet. Wetland systems associated with these surface waters are described in Table 4.2-1 and discussed in Section 4.2.3.3.

**Table 4.2-1: Wetland Systems within the Study Area**

| Wetland Number | Cowardin System Class* | Principal Function(s) ** |
|---|---|---|
| **Orange Line Connection** | | |
| W-1 | PFO1A | Floodflow Alteration, Sediment & Toxicant Retention |
| W-2 | PFO1A, R2UB1, R2UB2, R4 | Floodflow Alteration, Sediment & Toxicant Retention, Recreation |
| W-3 | PFO1A | Floodflow Alteration, Sediment & Toxicant Retention |
| W-8 | PEMIA | Sediment & Toxicant Retention |
| **Tysons Corner** | | |
| W-4 | PFO1A/C, PSS1A, R2UB1, and R2UB2 | Floodflow Alteration, Fish & Shellfish Habitat, Production Export, Sediment/Shoreline Stabilization, Wildlife Habitat, Recreation, Uniqueness/ Heritage |
| W-5 | PSS1C | Groundwater Recharge/ Discharge, Floodflow Alteration, Sediment & Toxicant Retention |
| W-6 | PEM1E | Sediment & Toxicant Retention |
| W-63 | R2UB1 | n.a. |
| W-9 | R4SB2 | n.a. |
| **Mid-Corridor** | | |
| W-10 | PFO1B and R2UB1 | Groundwater Recharge/ Discharge, Floodflow Alteration, Sediment & Toxicant Retention, Production Export, Sediment/ Shoreline Stabilization, Wildlife Habitat, Uniqueness/ Heritage |
| W-11 | PSS1C | Floodflow Alteration |
| W-12 | PFO1/2B and R2UB1 | Groundwater Recharge/Discharge, Fish & Shellfish Habitat |
| W-13 | PSS1A, PEM1A, and R2UB | Floodflow Alteration, Fish & Shellfish Habitat, Sediment & Toxicant Retention, Nutrient Removal, Production Export, Sediment/Shoreline Stabilization, Wildlife Habitat, Recreation, Uniqueness/Heritage |

| Wetland Number | Cowardin System Class* | Principal Function(s) ** |
|---|---|---|
| W-14 | PSS1A | Floodflow Alteration, Sediment & Toxicant Retention, Nutrient Removal, Sediment/Shoreline Stabilization |
| W-15 | PFO1C and R2UB2 | Sediment & Toxicant Retention, Sediment/Shoreline Stabilization |
| W-16 | PFO1C and R2UB2 | Groundwater Recharge/ Discharge, Sediment & Toxicant Retention, Nutrient Removal, Wildlife Habitat |
| W-17 | PSS1A and R2UB1/S | Floodflow Alteration, Fish & Shellfish Habitat, Sediment & Toxicant Retention |
| W-18 | R4SB1 | n.a. |
| W-20 | PEM1C | Nutrient Removal, Wildlife Habitat |
| W-60 | PFO1C and R4SB1 | Groundwater Recharge/Discharge, Floodflow Alteration, Sediment & Toxicant Retention, Production Export, Wildlife Habitat |
| W-61 | PFO1C, PEM1C, R2UB2, and R2UB1 | Groundwater Recharge/Discharge, Floodflow Alteration, Sediment & Toxicant Retention, Nutrient Removal, Sediment/Shoreline Stabilization |
| W-80 | PFO1A and PEM1A | Production Export, Wildlife Habitat, Floodflow Alteration, Nutrient Removal |
| **Dulles Airport** | | |
| W-OWA | R2UB2 | n.a. |
| W-FB/ FBA/F | PEM1A, PSS/PFO1A | Floodflow Alteration, Wildlife Habitat |
| W-KKK | PEM | Floodflow Alteration |
| W-RIS | PFO | Floodflow Alteration |
| W-21 | PEM1A | Floodflow Alteration, Sediment, Toxicant Retention |
| W-22 | R2UB2 | n.a. |
| W-26 | R2UB3 | n.a. |
| W-62 | R2UB1 | n.a. |
| **Loudoun County** | | |
| W-23 | PFO1A | Floodflow Alteration, Nutrient Removal, Wildlife Habitat |
| W-24 | PEM1A | Sediment & Toxicant Retention |
| W-25 | R2UB2 | n.a. |
| W-MMMA | PEM1A | Floodflow Alteration, Sediment & Toxicant Retention |
| W-MMMB | PEM1A; PFO1B | Floodflow Alteration, Sediment & Toxicant Retention |
| W-MMMC1/ MMMC2/ MMMD/ MMME | PFO1B; PEM1A | Floodflow Alteration, Sediment & Toxicant Retention |
| W-MMMF | PEM1A | Sediment & Toxicant Retention |
| W-MMMG | PFO1A | Groundwater Recharge/Discharge, Floodflow Alteration, Sediment & Toxicant Retention, Wildlife Habitat |
| W-MMMI/ MMMJ | PFO1A, PFO1A | Groundwater Recharge/Discharge, Floodflow Alteration, Sediment & Toxicant Retention, Wildlife Habitat |
| W-MMMK | PFO1A | Groundwater Recharge/Discharge, Floodflow Alteration, Sediment & Toxicant Retention, Wildlife Habitat |
| W-50 | PEM1/2C | Sediment and Toxicant Retention |
| W-51 | PEM1A, PFO1A, and R2SB3 | Production Export |
| W-Y1 | PEM1/2B, PFO1A, and R2UB1/2 | Floodflow Alteration, Sediment & Toxicant Retention, Nutrient Removal, Sediment/Shoreline Stabilization, Wildlife Habitat |

| Wetland Number | Cowardin System Class* | Principal Function(s) ** |
|---|---|---|
| W-Y2 | PEM1A, PFO1A, and R4SB2 | Sediment & Toxicant Retention, Nutrient Removal, Wildlife Habitat |
| W-Y3 | PSS1C | Groundwater Recharge/Discharge, Sediment & Toxicant Retention, Sediment/Shoreline Stabilization |
| W-Y4 | PFO1C | Wildlife Habitat, Visual Quality/Aesthetics |
| W-Y5 | R4UB1 | n.a. |

R2 = Lower Perennial Riverine System (always denotes a UB designation)
R4 = Intermittent Riverine System (always denotes an SB designation)
UB = Unconsolidated bottom
SB = Streambed
After UB or SB designations the following apply:
1-Cobble/Gravel Substrate
2-Sand Substrate
3-Mud Substrate

PEM = Palustrine Emergent
PES = Palustrine Scrub/Shrub
PFO = Palustrine Forested
1 = Persistent Vegetation
2 = Non-Persistent Vegetation
Water Regime:
A-Temporary
B-Saturated
C-Seasonally Flooded
E-Semipermanent

Source: *A Classification of Wetland and Deep-Water Habitats in the United States* (Cowardin, et al., 1979).
**Principal function as defined in the 1987 Corps of Engineers Wetland Delineation Manual
n.a. = The Wetland Delineation Manual includes functions for wetlands only.

### Orange Line Connection

Surface waters identified within this portion of the study area include the main stem of Pimmit Run and several headwater tributaries. These tributaries join the main stem of Pimmit Run in the highly urbanized areas of western Falls Church and Tysons Corner. An increased level of impervious cover resulting from the intense development throughout the Pimmit Run watershed has caused widespread channel degradation. Uncontrolled stormwater runoff from these impervious areas has created downstream scour and channelization of Pimmit Run and its tributaries. Most of the streams in the Pimmit Run watershed have been altered by concrete-lined substrates, which quickly convey stormwater and road runoff to Pimmit Run. This alteration is evidenced by channel incision and/or widening, unstable sediment bars, and bank erosion. Most riparian buffers (i.e., streambank vegetation) associated with the first-order tributaries in this area have been disrupted or removed. A forested riparian buffer is associated with segments of Pimmit Run downstream of Leesburg Pike, where it provides some bank stability and shade.

### Tysons Corner

The Scotts Run stream system, which flows northeast through the study area, originates in the intensely developed Tysons Corner area. The main stem of Scotts Run and its headwater tributaries drain major urban centers with very high levels of impervious cover. Portions of Scotts Run and most of its tributaries north of the DAAR and Dulles Toll Road have been diverted through a series of road culverts that have altered stream morphology (form and structure) in the Scotts Run watershed. Over-widening and channelization of the streams near these culverts have caused erosion downstream. The headwater tributaries of Scotts Run are affected by the high percentage of impervious cover as evidenced by bank and channel instability. However, the segment of Scotts Run south of the development along Route 123 flows through a forested stream valley, which has reduced the rate of bank and channel erosion.

### Mid-Corridor

This section of the study area bisects several large second-order streams, including Courthouse Spring Branch, Wolftrap Creek, Difficult Run, Sugarland Run and its tributaries, and tributaries to Horsepen Run. Streams in this portion of the alignment are relatively stable throughout their length north and south of the corridor. Most of the stream systems, except Sugarland Run and tributaries to Horsepen Run, are located east of Hunter Mill

Road, in areas of low-intensity development. Land use in this section of the alignment is composed of established or newly constructed residential areas adjacent to the forested stream valleys of these surface waters. Both Wolftrap Creek and Difficult Run are in stream valleys that have been designated as public parks. The forested riparian buffers of these streams provide bank stability and reduce the rate of erosion associated with channel alteration. However, localized erosion is occurring at the culverts and bridges along the DAAR and Dulles Toll Road due to the removal or displacement of the buffer for maintenance of the bridge crossings. The erosion has caused channel widening and increased sediment loads directly upstream and downstream.

The main stem of Sugarland Run and its tributaries, and the contributing surface waters of Horsepen Run are in the western portions of the Mid-Corridor between the towns of Reston and Herndon. The headwater tributaries of Sugarland Run drain the developed areas of Herndon and flow northeast to join the main stem of Sugarland Run along Fairfax County Parkway. The impervious areas, from which these tributaries originate, have increased water velocities at the headwaters, altering channel morphology. These tributaries are channelized throughout their lengths until they reach the main stem of Sugarland Run. Sugarland Run has been altered by beaver activity, which has caused several sections of the stream to become filled with sediment. In addition, the riparian buffer of this stream system has been removed to accommodate a commercial complex and overhead power lines.

Two headwater tributaries of Horsepen Run are on the north and south sides of the DAAR and Dulles Toll Road. The roadways serve as the drainage divide between the two streams. Both tributaries flow into larger streams that join Horsepen Run west of the DAAR and Dulles Toll Road/Route 28 interchange. The tributary north of the DAAR and Dulles Toll Road has been channelized throughout its length and diverted through several in-stream stormwater management ponds. The riparian buffer of the stream has been removed along the corridor and around the stormwater management facilities. The tributary south of the DAAR and Dulles Toll Road is situated in a forested parcel that provides bank stability and reduces the rate of erosion throughout the channel. The stream is intermittent, and conveys overland flow and seasonal base flows to a larger tributary of Horsepen Run.

### Dulles Airport

Surface waters identified in the Dulles Airport section include the main stem of Horsepen Run and its tributaries. This system flows northwest through airport property and along the south side of the DAAR and Dulles Toll Road. The main stem of Horsepen Run is relatively stable throughout its length except where it flows through undersized culverts and where localized erosion and silt deposition occurs. The banks are stabilized with riprap approximately 200 feet upstream of the proposed Metrorail alignment to prevent the Dulles Greenway from being undermined by the stream. The forested buffer associated with the stream has been cleared in some areas for maintenance of access roads and property rights-of-way. The tributaries originating within airport property are channelized in their headwaters due to the removal of the buffer to accommodate parking and runway facilities. The buffers are reestablished as the tributaries flow farther north towards their confluence with Horsepen Run. A large tributary, Indian Creek, enters the main stem of Horsepen Run from the north, depositing sand and silt from an extensive beaver complex located upstream of the DAAR and Dulles Toll Road.

### Loudoun County

Broad Run is one of the largest second-order streams within the study area. It flows in a northeast direction and has small tributaries entering the main stem both upstream and downstream of the Dulles Greenway. The main stem of Broad Run is stable throughout its length due to a heavily forested riparian buffer and low-density

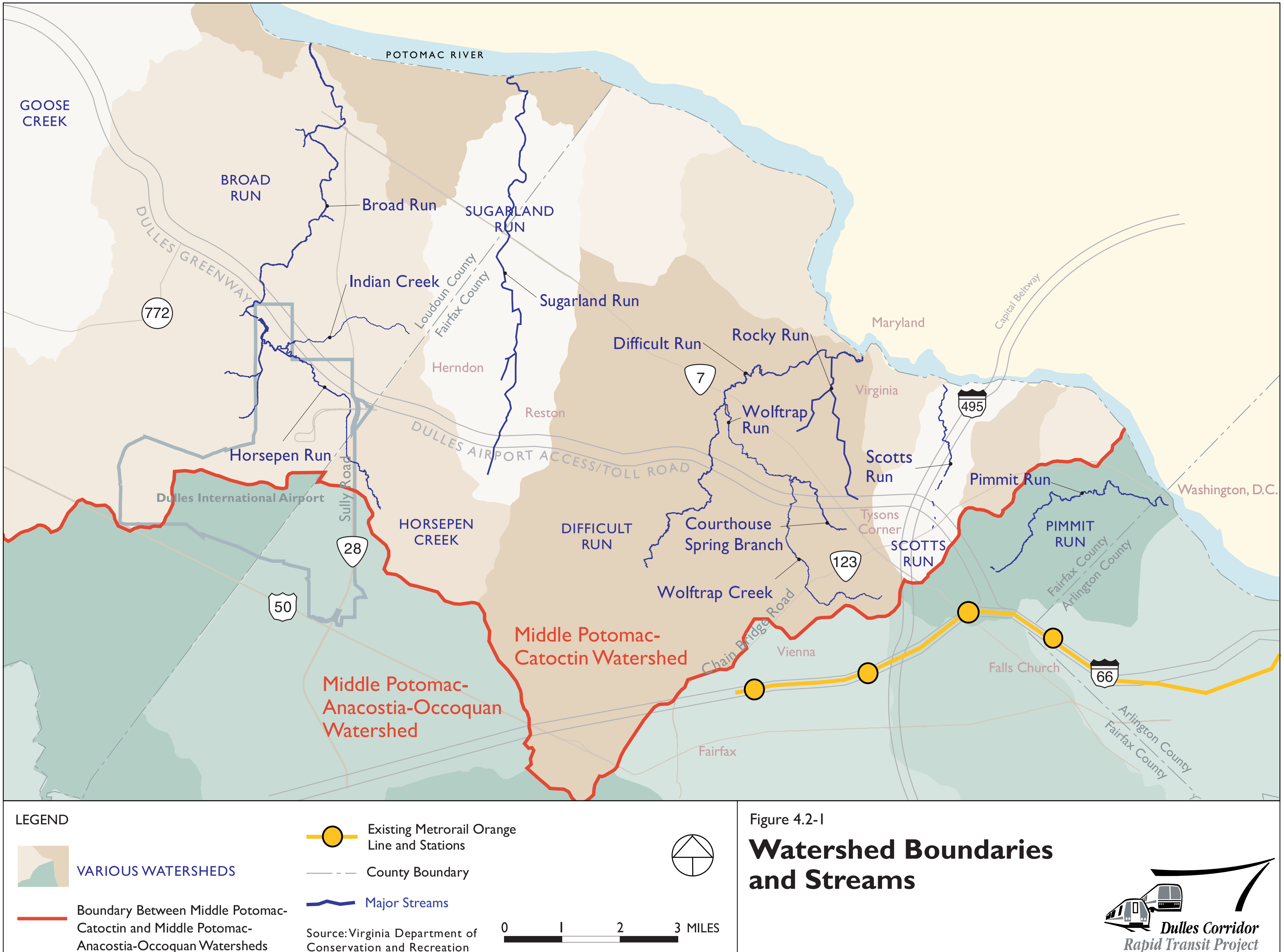



Figure 4.2-1

## Watershed Boundaries and Streams

Dulles Corridor Rapid Transit Project

land uses adjacent to the stream. However, removal of the buffer in and around the bridge span for the Dulles Greenway has caused localized erosion to occur, as evidenced by channel widening.

The tributaries entering Broad Run have been converted into ditches to convey surface runoff from adjacent construction sites. Silt and sand have been deposited in the channel substrates of these tributaries from upstream construction, and the stream's forested riparian buffers have been recently cleared for new development.

A tributary north of the Dulles Greenway flows east from the Route 607 interchange to enter the main stem of Broad Run. This stream is experiencing widespread siltation of the channel bed from increasing development within its headwaters and a beaver complex situated near its confluence with Broad Run. The beaver complex has created backwater conditions for most of the channel. A densely forested riparian buffer provides stream bank stability.

#### 4.2.3.2 Surface Water Quality

All of the Commonwealth's surface waters that contribute to the Potomac River and its tributaries are classified according to uses designated by the VDEQ Water Quality Standards. State law dictates that surface waters are to be maintained to protect existing beneficial uses. Existing beneficial uses include, but are not limited to, recreational uses such as swimming, boating, and production of edible and marketable natural resources. The designated uses include aquatic life habitat, fishing, shellfish production, swimming, and drinking water. The types of waters that are monitored and evaluated for support of these designations are subdivided into six classes, and standards are applied for ambient water quality. All surface waters identified within the study area are designated as Class III or non-tidal waters.

The assessment of the Commonwealth's water quality is based on the evaluation of both ambient and biological water quality data collected by VDEQ, USGS, VDCR, the Virginia Department of Health, and the Fairfax County Department of Public Works and Environmental Services. The results of VDEQ's ambient water quality parameters monitoring were reported in the *Virginia Water Quality Assessment 1998 305(b) Report*. The results, in conjunction with sampling conducted by VDEQ in January 1999, were used to establish baseline conditions for those streams that bisect the study area. Available data for pH, dissolved oxygen, and temperature from sampling stations near the Dulles Corridor within Pimmit Run, Difficult Run, Sugarland Run, and Horsepen Run indicate compliance with the Commonwealth's water quality standards. These streams and Broad Run have been designated as fully supporting waters of all five designated uses.

Surface waters located in the watersheds of Pimmit Run, Scotts Run, Difficult Run, and Sugarland Run were sampled for fecal coliform levels by the Fairfax County Health Department *(1999 Stream Water Quality Report,* Fairfax County 1999). The samples collected within all of these streams failed to meet the local water quality criteria, with none of the sites averaging under the limit in the past five years. Water quality data were not available for the portions of Broad Run and Horsepen Run located within the study area.

#### 4.2.3.3 Wetland Systems

Wetlands generally include swamps, marshes, and bogs. Federal and state regulations similarly define wetlands as areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

The 1987 Corps of Engineer's *Wetland Delineation Manual,* which employs a three-parameter approach for making wetland delineations (hydrophytic vegetation, hydric soils, and hydrology), was used to identify the

wetlands in the corridor. Areas that do not have these three parameters could also be regulated and include open-water, riverine systems, and certain disturbed areas. Areas that hydrologically convey water but do not exhibit all of the necessary parameters to be classified as a wetland could still be part of a wetland system. These areas are typically streams, unvegetated swales or low areas, which have apparent hydrology or hydrologic indicators but have little or no wetland vegetation or may lack hydric soils.

A total of 47 wetland systems were identified in the study area during field investigations conducted in December 2000 and February 2001. The locations of the wetland systems are shown on Figures 4.2-2a and 4.2-2b and listed in Table 4.2-1 above. The summary of each wetland system is based on Cowardin class, dominant vegetation, hydrology, soils, and principal functions. For the purposes of this document, a wetland system may include:

- A single forested, scrub-shrub, or emergent wetland;
- Portions of perennial streams and their tributaries;
- A combination of forested, scrub-shrub or emergent wetlands and any hydrologically connected streams and/or tributaries.

As outlined in *The Highway Methodology Workbook Supplement-Wetland Functions and Values: A Descriptive Approach*, principal functions and values are defined as an important physical component of a wetland ecosystem (function only), and/or are considered of special value to society from a local, regional, or national perspective. The functions and values defined by this methodology include: groundwater recharge/discharge, floodflow alteration, fish and shellfish habitat, sediment/toxicant/pathogen retention, nutrient removal/retention/transformation, production export, sediment/shoreline stabilization, wildlife habitat, recreation, educational/scientific value, uniqueness/heritage, and visual quality/aesthetics. The functions and values for the wetland systems identified within the corridor are included in Table 4.2-1. For a detailed description of the functions within each type of wetland system, refer to the *Natural Resources Technical Report* (June 2002).

#### 4.2.3.4 Floodplains

According to FEMA, the 100-year floodplain refers to the areas along or adjacent to a stream or body of water that are capable of storing or conveying floodwaters during a 100-year frequency storm. Within the study area, the 100-year floodplains are associated with larger stream systems in both Fairfax and Loudoun counties. These streams include Pimmit Run, Scotts Run, Courthouse Spring Branch, Wolftrap Creek, Difficult Run, Sugarland Run, Indian Creek, Horsepen Run, and Broad Run. Figure 4.2-3 shows the approximate locations of the 100-year floodplains within the study area.

The 100-year floodplains associated with Pimmit Run, Scotts Run, Sugarland Run, and their tributaries are situated in areas of intense development throughout Fairfax County. The encroachment of high-density commercial and residential land uses has reduced the forested component of these floodplains, replacing them with impervious cover or residential lawns. Frequent disruption and alteration of these floodplains occurs near the DAAR and Dulles Toll Road due to the removal of vegetation for roadway maintenance and the use of concrete to stabilize stream banks.

The 100-year floodplains of Courthouse Spring Branch, Wolftrap Creek, and Difficult Run are surrounded by low-density residential land uses. Most of the forested stream valleys have been retained as public parks or recreation areas in which minimal disturbance is allowed. Vegetation has been removed within the floodplain


LEGEND

W1 Wetland System Number

Major Streams

Tributary Streams

Existing Metrorail Orange Line and Stations

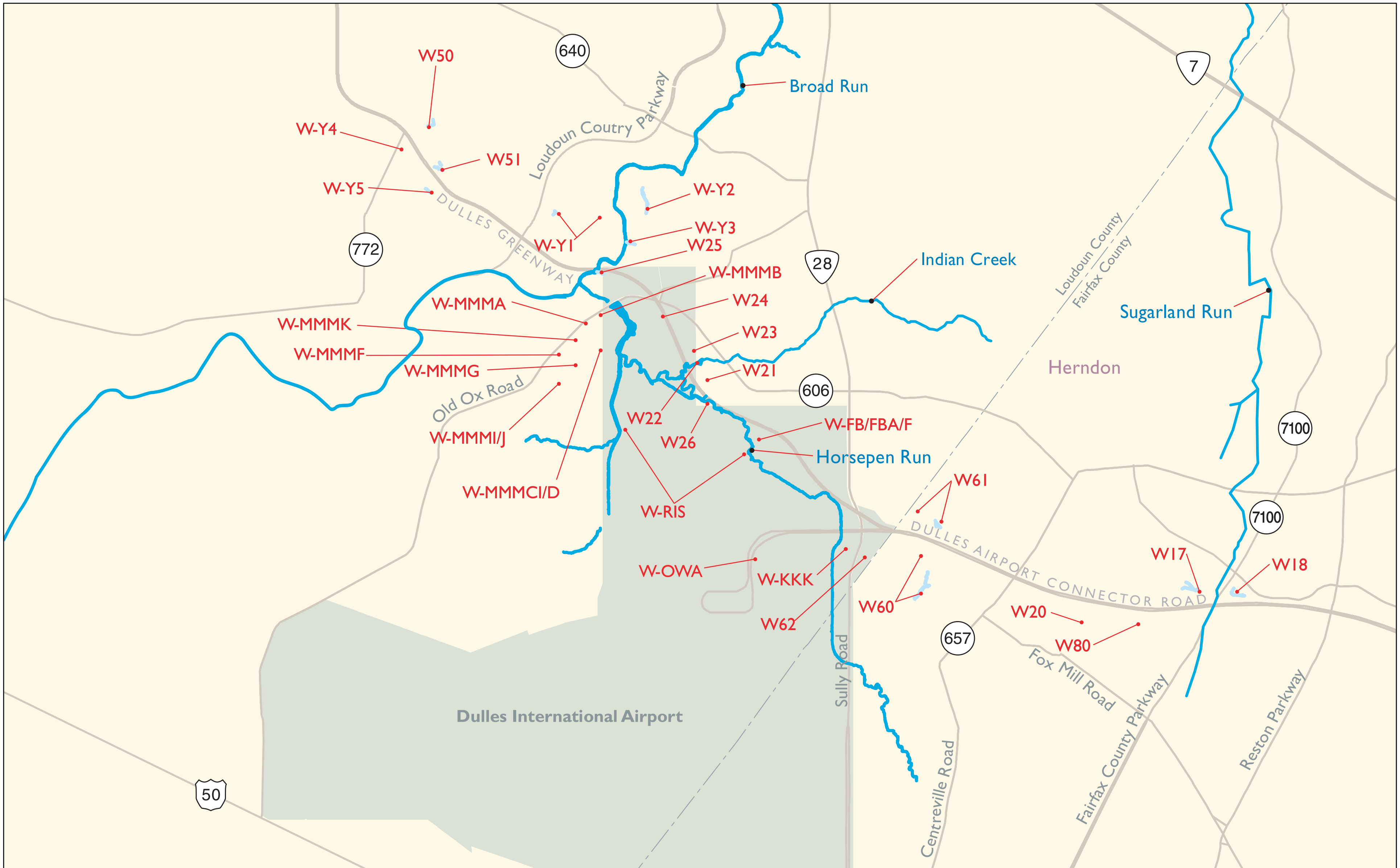
County Boundary

0 3000 6000 FEET

Figure 4.2-2a

# Wetland Systems

Dulles Corridor Rapid Transit Project




LEGEND

W17 Wetland System Number

Major Streams

Tributary Streams

County Boundary

0 3000 6000 FEET

Figure 4.2-2b

# Wetland Systems

Dulles Corridor Rapid Transit Project


LEGEND

Floodplain Limits

Streams

Existing Metrorail Orange Line and Stations

County Boundary

Source: Federal Emergency Management Agency (FEMA)

0 1 2 3 MILES

Figure 4.2-3

# Limits of 100-Year FEMA Floodplain within Study Area

Dulles Corridor Rapid Transit Project

of Difficult Run near the DAAR and Dulles Toll Road for roadway and utility maintenance along the bridge span.

The broadest 100-year floodplains (1,000 to 3,000 feet wide) within the study area occur along Broad Run, Indian Creek, and Horsepen Run. These floodplains are generally forested upstream and downstream of the study area, with some disturbance occurring near the Dulles Greenway for bridge and road maintenance. Within portions of the Indian Creek floodplain on Dulles Airport property, substantial amounts of vegetation have been removed for the construction of runways, access roads, and maintained ditches. Loudoun County's River and Stream Corridor Overlay District (RSCOD), which includes minor and major floodplains, and Chesapeake Bay Preservation Areas (CBPAs), are discussed in the following section.

#### 4.2.3.5 Critical Areas

Several types of critical areas were investigated to assess whether they are present within the study area: CBPAs, Environmental Quality Corridors (EQCs), RSCODs, impaired streams, wild natural trout streams, wild and scenic rivers, navigable waters, and the coastal zone.

##### Chesapeake Bay Preservation Areas

As defined in Section 3.2, the Chesapeake Bay Preservation Act establishes CBPAs in Fairfax County. Figure 4.2-4 depicts Fairfax County's CBPAs, which include RPAs and RMAs. The RPAs and RMAs are subject to the criteria and requirements contained in the Chesapeake Bay Preservation Ordinance (Chapter 118 of the Fairfax County Code) including the following:

- No more land shall be disturbed than is necessary to provide for the allowed use, development, or redevelopment.
- Indigenous vegetation shall be preserved to the maximum extent possible.
- Periodic maintenance of BMPs shall be ensured through a maintenance agreement.
- Impervious cover shall be minimized.
- Any land-disturbing activity that exceeds an area of 2,500 square feet shall comply with the sediment and erosion control requirement (Chapter 104 of the Fairfax County Code).
- Stormwater runoff shall be controlled by the use of BMPs contained in the County Code and Public Facilities Manual.
- The Director shall require certification on all plans of development that all wetland permits will be obtained.

According to the Fairfax County Geographic Information System, areas designated as RPAs extend along major streams and tributaries that cross the study area including Pimmit Run, Scotts Run, Difficult Run, and Surgarland Run. The limits of the RPAs include a 100-foot-wide buffer on either side of these streams. Where wetlands are contiguous and connected by surface flow to tributary streams, a 100-foot buffer would be measured from the boundary of the wetland. The extent of the RMAs covers all areas in Fairfax County outside of the RPAs.

Land development and redevelopment may be allowed within an RPA if otherwise permitted by the Zoning Ordinance and subject to the requirement of the *Public Facilities Manual* and to the performance criteria of the Chesapeake Bay Preservation Ordinance.

Loudoun County is outside the jurisdiction of the Chesapeake Bay Preservation Act, because the Act did not identify Loudoun County as being within "Tidewater Virginia."

### Environmental Quality Corridors

EQC designations and boundaries are determined during the zoning process (the review of re-zonings, special exceptions, special permits, variances, and related development applications) through the application of criteria in the Comprehensive Plan. Development is controlled within the EQC only when such land is acquired by the County, when commitments are made by land owners and developers, when conditions are imposed through the zoning process, or when EQC areas also lie within regulated areas (e.g., Resource Protection Areas; floodplains).

WMATA is presently coordinating with Fairfax County to identify EQCs in the study area that are potentially affected by proposed stations and other facilities so that effects can be minimized. This process will be completed and the results incorporated into the Final EIS.

### River and Stream Corridor Overlay District

The RSCOD is a designation used in the *Loudoun County Revised General Plan* to classify floodplains as major or minor. The county distinguishes floodplains draining more than 640 acres as major floodplains and floodplains draining between 100 and 640 acres as minor floodplains. The County limits development in both classes of floodplains, and prohibits the channelization and/or diversion of streams draining major floodplains. It also limits development within a 150-foot buffer on either side of streams that drain more than 640 acres. Depending on the extent of wetlands, steep slopes, and floodplains, the buffer distance can be increased to 300 feet on either side of a stream.

The *Loudoun County Revised General Plan* identifies stream corridors as important in filtering out impurities in surface runoff moving toward a stream, as wildlife corridors, and in the preservation of valuable historic, archaeological, and scenic features. Figure 4.2-5 shows the major and minor floodplains of the RSCOD in Loudoun County. Within the study area, Horsepen Run and Broad Run are in this District.

The *Loudoun County Zoning Ordinance* will be amended to prohibit development within these buffers with specific exceptions. Development within the RSCOD is limited to open space and recreational uses that are water-dependent; greenways and trails; improvements associated with historic, cultural, or archaeological sites; stormwater management facilities; agricultural and silviculture activities; and the placement of sewer and water lines. Road crossings, rail crossings, bridges, and driveway crossings are allowed only when the environmental objectives of the RSCOD can be maintained or enhanced. The county also encourages land within stream corridors to be placed in permanent protective conservation easements.

### Impaired Streams

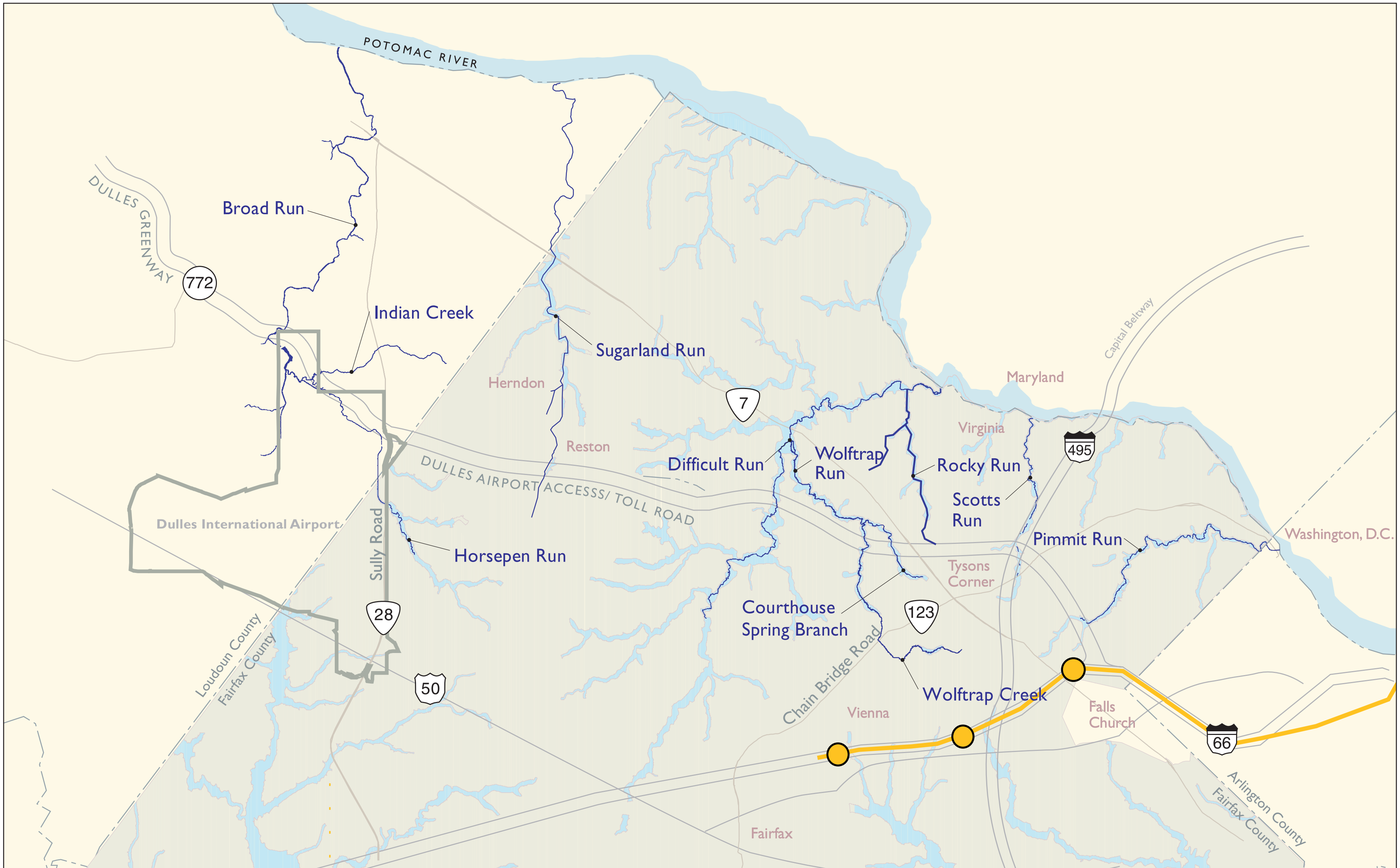
According to the 1998 *303(d) Total Maximum Daily Load Priority List and Report*, Difficult Run is listed as an impaired stream from its confluence with Captain Hickory Run downstream to its confluence with the Potomac River. This section of Difficult Run is located several miles downstream of the study area. No other streams that bisect the study area are listed as impaired by VDEQ.

### Wild Natural Trout Streams

The Virginia Department of Game and Inland Fisheries (VDGIF) has established a classification system for trout waters based on aesthetics, productivity, resident fish population, and stream structure. There are no surface waters in the study area that are designated as wild natural trout streams.

### Wild and Scenic Rivers

There are no federal Wild and Scenic Rivers or State Scenic Rivers in or near the study area.




LEGEND

Resource Management Areas (RMA)

Resouce Protection Areas (RPA)

Existing Metrorail Orange Line and Stations

Major Streams

County Boundary

Source: Fairfax County GIS and Mapping Department

0 1 2 3 MILES

Figure 4.2-4

**Chesapeake Bay Preservation Areas Fairfax County, VA**

Dulles Corridor Rapid Transit Project

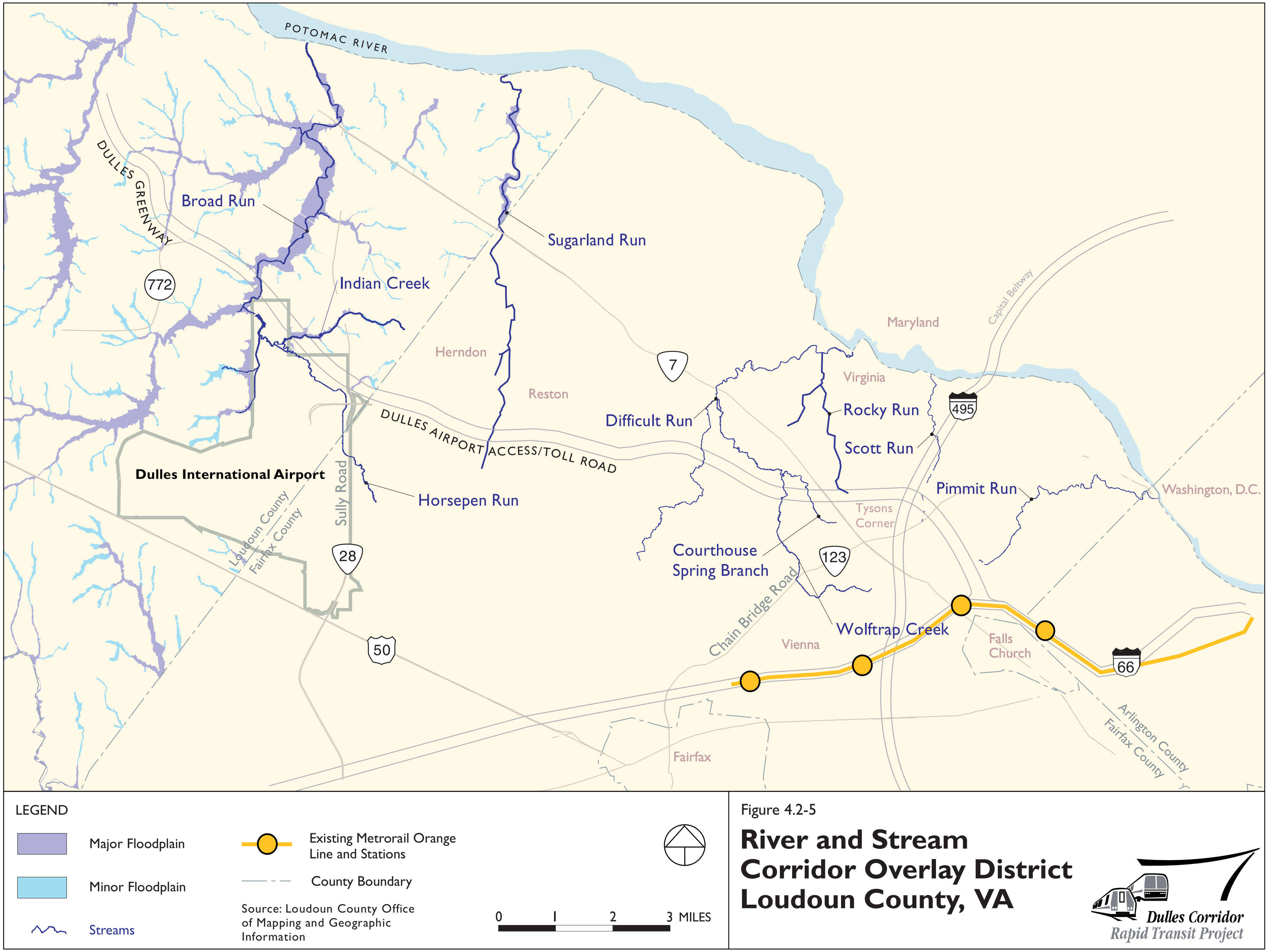



Figure 4.2-5

**River and Stream Corridor Overlay District Loudoun County, VA**

### Coastal Zone

The Coastal Zone Management Act of 1972 requires that federal actions that are likely to affect any land or water use or natural resources of the coastal zone be consistent with the enforceable policies of a state coastal management program. The Commonwealth established the Virginia Coastal Resources Management Program in 1986 to protect and manage Virginia's coastal zone. The project is not located in the coastal zone.

### Hazardous Wildlife Attractants At or Near Airports

The FAA may review development and/or mitigation plans within five statute miles of an airport's aircraft movement areas, loading ramps, or aircraft parking areas to determine if such changes present potential wildlife hazards to aircraft operations. According to FAA Advisory Circular No. 150/5200-33, all species of wildlife can pose a threat to aircraft safety. However, some species are more commonly involved in aircraft strikes, such as gulls, waterfowl, raptors, doves, vultures, blackbirds, starlings, corvids (i.e., crows and ravens), wading birds, deer, and canids (i.e., wolves, foxes, coyote). The habitats for these species are mainly wetland areas that could be hazardous wildlife attractants. Based on this FAA circular, relocated wetlands, relocated and new stormwater management ponds, and similar alterations to wetlands as defined above, within up to 10,000 feet of an airport, must be assessed for their ability to increase hazardous wildlife.

## 4.2.4 LONG-TERM EFFECTS

The long-term effects to water resources from the proposed implementation of the Baseline and the four Build Alternatives are discussed below. Long-term effects are those that would permanently alter the hydrology and function of the water resource. For example, excavating a floodplain would permanently alter its ability to attenuate floodwater; filling a wetland would permanently alter its hydrology and its ability to function as a wetland. Furthermore, failure to control stormwater and sediments from a construction site could permanently affect water quality and function of a water resource. Where applicable, the discussions of long-term effects are organized by the type of water resource under each alternative.

In compliance with Federal and state regulations, efforts were made to avoid impacts to wetland systems and floodplains. In several cases, station facilities and/or the alignment were shifted to avoid or minimize their effect on several wetlands and/or floodplains. In areas where impacts where unavoidable, appropriate and practicable compensatory mitigation would be implemented.

The following resources and designations do not occur in the Dulles Corridor and are not discussed below: wild and natural trout streams, wild and scenic rivers, state scenic rivers, and coastal zones. The effects of the Baseline and the four Build Alternatives on water resources are summarized in Table 4.2-2. Potential effects incorporated in Table 4.2-2 include effects to wetland systems, stream water quality, CBPAs, EQCs, and RSCODs. Also included in the table are indirect impacts caused by the proximity of project construction and potential effects to floodplains and drainage systems.

### 4.2.4.1 Baseline Alternative

Under the Baseline Alternative, there would be no effects to water resources from the Dulles Corridor Rapid Transit Project. Effects from improvements assumed under this alternative are the responsibility of the agencies and jurisdictions implementing the improvements.

### 4.2.4.2 BRT Alternative

The BRT Alternative is comprehensively described in Section 2.3.1. Because the majority of the BRT stations, stops, and facilities would be located within developed areas and away from water resources, and BRT vehicles

would use existing roadways, minimal long-term effects to water resources are anticipated from implementing the BRT Alternative. In addition, the effects to water resources from the various BRT alignments (BRT 1, BRT 2, and BRT 3) are almost identical. Exceptions are noted below. Table 4.2-3 contains a summary of the effects to water resources from the implementation of the BRT Alternative.

### Orange Line Connection

Four wetland systems (W-1, W-2, W-3, and W-8) are located within the Orange Line Connection. No impacts are anticipated for W-1, W-3, or W-8. Under each BRT alignment, no new stops or stations would be located within this portion of the study area and BRT vehicles would travel on the existing lanes of the Dulles Connector Road. No water resources exist in the vicinity of the bus layover facility.

Pimmit Run and its tributaries (W-2) are the only surface water features within the Orange Line Connection portion of the study area. Because the BRT system would use existing roadways and bridges over Pimmit Run, no impacts to this resource would occur. Water quality in Pimmit Run would not be substantially altered by the addition of BRT vehicles to existing roadways. The floodplain, CBPA, and EQC designations associated with Pimmit Run also would not be affected.

### Tysons Corner

Scotts Run, its tributaries, and associated wetlands (W-4), and four other wetland systems (W-5, W-6, W-63, and W-9) are located in Tysons Corner. Water resources in this area are located north of the DAAR and the Dulles Toll Road, away from the proposed BRT station and its facilities at Spring Hill Road (BRT 1) and the Tysons-West*Park Transit Station (BRT 2 and BRT 3).

**Table 4.2-2: Effects to Water Resources**

| Water Resources | Effects | | | | |
|---|---|---|---|---|---|
| | Baseline | BRT Alternative* | Metrorail Alternative | BRT/Metrorail Alternative | Phased Implementation |
| Pimmit Run (W-2) | – | Proximity[1] | Proximity[1]<br>100-Year Floodplain[2]<br>CBPA[3]<br>Water Quality[3] | Proximity[1]<br>100-Year Floodplain[2]<br>CBPA[3]<br>Water Quality[3] | Proximity[1]<br>100-Year Floodplain[2]<br>CBPA[3]<br>Water Quality[3] |
| Scotts Run (W-4) | – | – | 100-Year Floodplain[2]<br>CBPA[3]<br>EQC[3] | 100-Year Floodplain[2]<br>CBPA[3]<br>EQC [3] | 100-Year Floodplain[2]<br>CBPA[3]<br>EQC[3] |
| Unnamed Perennial Stream (W-4) | – | – | Proximity[1] (T4) | Proximity[2] (T4) | Proximity[1] (T4) |
| Intermittent Stream (W-63) | – | – | | | |
| Intermittent Stream (W-9) | – | – | | | |
| Difficult Run (W-13) | – | – | 100-Year Floodplain[2]<br>Proximity[1] | – | 100-Year Floodplain[2]<br>Proximity[1] |
| Sugarland Run (W-17) | – | – | Proximity[1] | – | Proximity[1] |
| Channel (W-18) | – | – | Proximity[1] | – | Proximity[1] |
| W-FB/FBA/F | – | – | Wetland Impact (0.01 acre)<br>Proximity[1] | | Wetland Impact (0.01 acre)<br>Proximity[1] |

| Water Resources | Effects | | | | |
|---|---|---|---|---|---|
| | Baseline | BRT Alternative* | Metrorail Alternative | BRT/Metrorail Alternative | Phased Implementation |
| Tributary to Horsepen Run (W-OWA) | – | – | Alteration of base flow (80 Linear Feet) | – | Alteration of base flow (80 Linear Feet) |
| W-80 | – | Wetland Impact (0.12 acre) | Wetland Impact (0.12 acre) | Wetland Impact (0.12 acre) | Wetland Impact (0.12 acre) |
| W-60 | – | Proximity[1] (BRT 1) | Proximity[1] | Proximity[1] | Proximity[1] |
| W-61 | – | Proximity[1] (BRT 1) 100-year Floodplain[3] EQC[3] | Proximity[1] 100-year Floodplain[3] EQC[3] | EQC[3] Proximity[1] 100-year Floodplain[3] | Proximity[1] 100-year Floodplain[3] EQC[3] |
| W-RIS (Exit to Greenway) | – | – | Wetland Impact (0.01 acre) 100-year Floodplain[2] Loudoun Co. Floodplain[2] | - | Wetland Impact (0.01 acre) 100-year Floodplain[2] Loudoun Co. Floodplain[2] |
| Perennial Stream (W-26) | – | – | Proximity[1] | – | Proximity[1] |
| W-51 | – | Wetland Impact (0.46 acre) (772 Stop – North Option) Stream Impact (96 linear feet) (772 Stop – North Option) | Wetland Impact (0.46 acre) (772 Station – North Option) Stream Impact (96 linear feet) (772 Station North Option) | Wetland Impact (0.46 acre) (772 Stop – North Option) Stream Impact (96 linear feet) (772 Stop – North Option) | Wetland Impact (0.46 acre) (772 Station – North Option) Stream Impact (96 linear feet) (772 Station – North Option) |
| | – | | – | | |
| W-23 | – | Proximity[1] | – | Proximity[1] | |
| Broad Run (W-25) | – | 100-year Floodplain[3] RSCOD[3] | 0.6-foot increase in 100-Year Floodplain Elevation RSCOD[3] | RSCOD[3] 100-year Floodplain[3] | 0.6-foot increase in 100-Year Floodplain Elevation RSCOD[3] |
| W-Y1 | – | – | Proximity[1] | – | Proximity[1] |
| W-Y5 | – | Proximity[1] | Proximity[1] | Proximity[1] | Proximity[1] |
| W-MMMA | - | - | Wetland Impact (0.20 acre)[4] | | Wetland Impact (0.20 acre)[4] |
| W-MMMB | - | - | Wetland Impact (0.14 acre)[4] | | Wetland Impact (0.14 acre)[4] |
| W-MMCI/MMD | - | - | Wetland Impact (0.02 acre)[4] | | Wetland Impact (0.02 acre)[4] |
| W-MMMG | - | - | Wetland Impact (0.25 acre)[4] | | Wetland Impact (0.25 acre)[4] |
| W-RIS (Yard Lead for Yard 15 | - | - | Wetland Impact (0.01 acre)[4] | | Wetland Impact (0.01 acre)[4] |

CBPA = Chesapeake Bay Preservation Areas
EQC = Environmental Quality Corridor
RSCOD = Loudoun County River and Stream Corridor Overlay District
*Existing drainage systems may require improvements as a direct result of the BRT and Metrorail alternatives.
1 Proximity to construction could alter the hydrology and/or function of water resources
2 Potential effect, however, no increase in floodplain elevation is anticipated
3 Minimal effect
4 Direct wetland impacts for Metrorail S&I Yard Site 15. Metrorail S&I Yard Site 20 wetlands not delineated, but assumed to minimal, Metrorail S&I Yard Site 7 has no wetland impacts.

**Table 4.2-3: BRT Alternative Wetland/Waterway Effects**

| Wetland Number | Alignment Station or Stop | Wetland Impact (Acres) | Stream Impact (Linear feet) |
|---|---|---|---|
| W-80 | Herndon-Monroe Station (West Structure) | 0.12 | – |
| W-51 | Route 772 Stop (North Option) | 0.46 | 96 (two stream segments) |
| TOTAL | | 0.58 | 96 |

1 Ephemeral streams are not regulated in the Commonwealth of Virginia.

### Mid-Corridor

Thirteen wetland systems (W-10, W-11, W-12, W-13, W-14, W-15, W-16, W-17, W-18, W-20, W-60, W-61, and W-80) are located within the Mid-Corridor. Effects to W-60, W-61, and W-80 are discussed below. No impacts to the other wetland systems named above are anticipated because BRT vehicles would travel on the existing lanes of the DAAR and Dulles Toll Road, and stations, stops, and facilities would be located away from them.

The BRT stations and facilities proposed at Wiehle Avenue and Reston Parkway would be located in developed areas away from water resources. The park-and-ride facility at the Herndon-Monroe Station would be expanded to the east and west of the existing garage. The facility to the west would affect 0.12 acre of a palustrine-emergent wetland (W-80). Mitigation is discussed in Section 4.2.7.

Under BRT 1, at the Route 28 BRT Station, a forested wetland and an unnamed stream (W-61) are located adjacent to the station facility that would be located to the north of the DAAR. In addition, a portion of the facility would be located within a FEMA-designated 100-year floodplain of the stream. South of the DAAR, another forested wetland (W-60) is located close to the station facility. Construction of such facilities in proximity to the stream and the wetlands could alter the hydrology and function of water resources. However, BMPs would be used to ensure erosion and sediment control. Thus, it is anticipated that long-term effects to the hydrology and wetland functions would be minimal. The other BRT alignments (BRT 2 and BRT 3) do not include a station at Route 28. A small portion of an EQC associated with W-61 would potentially be affected. The project team is continuing coordination with Fairfax County to delineate the extent of EQCs.

Surface water features in the Mid-Corridor include Courthouse Spring Branch, Wolftrap Creek, Difficult Run, Sugarland Run and its tributaries, and the tributaries to Horsepen Run. Because all the BRT alignments would use existing roads, and facilities would be located away from these surface waters, no impacts to these resources or their associated floodplains would be anticipated. Water quality in Difficult Run and Sugarland Run, the two streams that are monitored by VDEQ, would not be affected.

The CBPA and EQC designations associated with Difficult Run and Sugarland Run would not be affected. Difficult Run, several miles downstream from the study area, is listed as an impaired stream in the *1998 303 (d) Total Maximum Daily Load Priority List and Report*. The BRT Alternative would not affect this condition.

The potential parking structure to the west of the existing structure at the proposed Herndon-Monroe Station would be located on a temporary conservation easement. The plat map shows a temporary conservation easement through Parcel 27, property of Fairfax County Board of Supervisors, Hunter Mill District, Fairfax County, Virginia. The area is described as a temporary conservation easement that shall remain valid until such time as property is developed with adequate stormwater management and BMP measures. The proposed west

structure would cover a very small area of the easement. Adequate stormwater management facilities would be installed and appropriate BMP measures would be used during the construction and operation of the facility.

Proposed stormwater management facilities west of Centreville Road would be designed and constructed in compliance with FAA Circular 150/5200-33.

### Dulles Airport

Eight wetland systems (W-OWA, W-FB/FBA/F, W-KKK, W-RIS, W-21, W-22, W-26, and W-62) are located within the Dulles Airport portion of the study area. No impacts to these resources are anticipated because BRT vehicles would travel on the DAAR and existing airport roads. Similarly, the BRT stop and layover facility would be located in already developed areas and away from those resources.

No water resources exist in the vicinity of the Dulles Airport BRT Stop. Horsepen Run and its tributaries, including Indian Creek, are the only surface water features within the Dulles Airport portion of the study area. Because the BRT system would use existing roadways, no impacts to these surface waters would occur. Water quality in Horsepen Run would not be altered substantially by the addition of the BRT vehicles to existing roadways. The Loudoun County RSCOD associated with Horsepen Run would not be affected.

Proposed stormwater management facilities in this portion of the study area would be constructed in compliance with FAA Circular 150/5200-33.

### Loudoun County

Ten wetland systems (W-23, W-24, W-25, W-50, W-51, W-Y1, W-Y2, W-Y3, W-Y4, and W-Y5) are located within the Loudoun County portion of the study area. Impacts to W-51, W-23, and W-Y5 are discussed below. No impacts to the other wetland systems named above are anticipated because the BRT vehicles would travel initially on the Dulles Greenway, and the Route 606 Stop would be located away from those resources.

Broad Run and Horsepen Run and their tributaries are the only surface water features within the Loudoun County portion of the study area. Because the BRT system would use existing roadways and bridges over Broad Run, no impacts to this surface water would occur. The addition of BRT vehicles to existing roadways and the construction of the Route 606 BRT Stop in the nearby Dulles North Transit Center would not substantially affect water quality in Broad Run.

Under the northern option for Route 772 BRT Stop, facilities would be located north of the Dulles Greenway, affecting 0.46 acre of a palustrine emergent wetland (W-51) and approximately 96 linear feet of an associated intermittent tributary to Broad Run. To minimize long-term effects, the facilities would be designed to avoid direct impacts to the tributary and the wetland to the extent possible. However, the increased impervious surface surrounding the wetland would likely alter the hydrology of the system. In addition, for a planned access road, the stream crossing would have a pipe placed in the channel to maintain current flow. Most of the tributary has already been converted to a ditch to convey surface runoff. Mitigation is discussed in Section 4.2.7.

The southern option for the Route 772 BRT Stop would be located south of Dulles Greenway. An intermittent tributary to Broad Run is located in the southeast corner of the site. It is likely that the placement of the Route 772 Stop in this location would have minimal affects on the hydrology of W-Y5.

An increase in impervious surface would occur from the installation of paved areas for the bus bays and Kiss & Ride lots. Uncontrolled runoff from impervious surfaces can potentially affect stream stability by alterning channel morphology. These indirect impacts are caused by increases in level and frequency of peak discharges to receiving streams as runoff increases velocity across paved surfaces. Backwater or increased scour, sediment deposition, over-widening, and bank erosion could occur in areas downstream of the facility, affecting water quality. To mitigate these effects, adequate measures for control of erosion and sediment, stormwater management, and BMPs should be in accordance with the guidelines, policies, standards, and specifications contained in the *Public Facilities Manual*, and *Virginia Erosion and Sediment Control Handbook,* Chapter 104 (Erosion and Sediment Control) of the Fairfax County Code, and all other applicable requirements. Proposed stormwater management facilities in this portion of the study area would be designed and constructed in compliance with FAA Circular 150/5200-33.

### BRT Maintenance and Storage Facility

The BRT Maintenance and Storage Facility would be located near a palustrine-forested wetland (W-23) and partially within the 100-year floodplain and the Loudoun County RSCOD for Broad Run. In accordance with the *Loudoun County Revised General Plan*, rail crossings are allowed only when the environmental objective of the RSCOD can be maintained or enhanced. Clearing and grading of forested land would be required to construct the facility and would increase the areas of impervious surfaces. However, the facility would not encroach upon the wetland. Thus, long-term effects are not anticipated.

Proposed stormwater management facilities in this portion of the study area would be designed and constructed in compliance with FAA Circular 150/5200-33.

### 4.2.4.3 Metrorail Alternative

The long-terms effects on water resources from implementing the Metrorail Alternative are discussed below. Table 4.2-4 summarizes these effects.

**Table 4.2-4: Metrorail Alternative Wetland/Waterway Effects**

| Wetland Number | Station or Area of Alignment | Wetland Impact (acres) | Stream Impact (Linear feet) |
|---|---|---:|---:|
| W-63 | Tysons West Station | - | - |
| W-9 | Tysons West Station | – | - |
| W-80 | Herndon-Monroe Station (West Structure) | 0.12 | – |
| W-FB/FBA/F | Dulles Airport (Horsepen Run Crossing) | 0.01 (Piers) | – |
| W-RIS | Dulles Airport (Exit to Greenway) | 0.01 (Piers) | |
| W-51 | Route 772 Stop (North Option) | 0.46 | 96 (two stream segments |
| W-OWA | Dulles Airport | – | 80 |
| W-MMMA | S&I Yard Site 15 | 0.20 | - |
| W-MMMB | S&I Yard Site 15 | 0.14 | - |
| W-MMMC/MMD | S&I Yard Site 15 | 0.02 | - |
| W-MMMG | S&I Yard Site 15 | 0.25 | - |
| W-RIS | S&I Yard Site 15 | 0.01 (Piers) | - |
| TOTAL | | **0.60 - 1.22[1]** | 176 |

1 Total wetland impacts anticipated to be 0.60 acre if Metrorail S&I Yard Sites 7 or20 are selected. Impacts could reach as high as 1.22 acres if Metrorail S&I Yard Site 15 is selected.

### Orange Line Connection

Pimmit Run and its tributaries (W-2) and three wetland systems (W-1, W-3, and W-8) are located within the Orange Line Connection portion of the study area. No impacts to W-1, W-3, or W-8 are anticipated with the implementation of the Metrorail Alternative. Impacts to Pimmit Run and one of its tributaries are discussed below.

North of the Dulles Connector Road and I-66 interchange, the alignment would cross an unnamed perennial stream (part of W-2) that is piped under the Dulles Connector Road to join a concrete-lined tributary to Pimmit Run. The proposed Metrorail alignment would use the existing stormwater management facilities along the Dulles Connector Road. Because the stream has already been piped under the existing roadway, it is not anticipated that the construction and operation of a Metrorail alignment would permanently affect the hydrology or function of the stream.

The Metrorail alignment would also cross Pimmit Run. To span the gap between the existing Dulles Connector Road bridge lanes over the stream, a concrete section would be added. Piers would be placed within the 100-year floodplain of the stream to support this new bridge section. The new Metrorail bridge piers would be placed parallel to existing highway bridge piers and would have minor effects on the floodplain. The new bridges are not anticipated to constrict the channel's water flow; therefore, no change in the 100-year floodplain elevation is anticipated. On-site flooding would not affect the proposed bridge structure, which would be located well above the floodplain elevation. Additionally, off-site flooding risk would not change because there would be no change in floodplain elevation associated with the new bridge piers.

Piers for the bridge extension over Pimmit Run would also be placed within the RPA of the stream. Despite the permanent pier structures, no further disturbance to the RPA is anticipated because most of the area near the proposed bridge spans has already been cleared and graded to support existing bridge structures. Water quality in Pimmit Run would not be substantially altered because of the limited amount of new impervious surface area added and pollution constituents that could enter Pimmit Run.

North of the Pimmit Run Crossing, a tie-breaker station (B-3) would be located near a flume that directs road runoff. Because this structure is concrete-lined and already directs roadway runoff, long-term effects to the hydrology and water quality of this stream or Pimmit Run would not occur.

The Metrorail alignment would also be located partially within the RPA of the unnamed perennial stream piped under the Dulles Connector Road that joins a concrete-lined tributary to Pimmit Run. The RPA extends along the Dulles Connector Road until Idylwood Road. However, because the Metrorail alignment would be in the median of the existing roadway, long-term effects to the RPA are not anticipated.

Because only minimal changes would occur within the CBPA and EQC designations associated with Pimmit Run, these critical areas would not be affected.

### Tysons Corner

Scotts Run and its tributaries (W-4), and four wetland systems ( W-5, W-6, W-63, and W-9) are located in Tysons Corner. Within Tysons Corner, the locations of Metrorail alignments and the majority of Metrorail stations and facilities are proposed for developed areas away from water resources. Impacts to Scotts Run (W-4, W-63, and W-9) are discussed below. No impacts are anticipated for the other wetland systems named above.

**Alignment T1.** At the proposed Tysons East Station, station facilities would be adjacent to Scotts Run. Tysons East Station would be an aerial station spanning the stream. Piers to accommodate the station and facilities would be located outside of Scotts Run, but within the 100-year floodplain and the RPA for the stream. To avoid long-term effects to water quality and reduce existing nonpoint source pollution in the area, a stormwater management pond would be located in the southwest corner of the site. The site would be designed such that runoff would flow into the pond during and after construction. Additionally, the quantity of water would be appropriately maintained. Therefore, minimal long-term effects to this surface water resource and water quality are anticipated.

The floodplain of Scotts Run would not be affected by the placement of piers for the Metrorail bridge. The new piers would be parallel with existing bridges piers and they are not anticipated to constrict the channel's water flow. No change in the 100-year floodplain elevation is anticipated. On-site flooding would not affect the proposed bridge structure, and off-site flooding risk would not change. The CBPA and EQC designations associated with Scotts Run would not be substantially affected. At Tysons East Station, the facilities would shade a portion of an intermittent stream (W-63), which would have a minimal effect on the stream. This stream drains to Scotts Run.

At the Tysons West Station, the facilities would be located in an area that currently contains light industrial development. The new station and associated facilities would require piping a portion of a concrete-lined tributary (W-9). The tributary is an intermittent stream in the headwaters of Rocky Run, which drains into Difficult Run. It currently functions as a stormwater management channel. Piping sections of the stream to accommodate the paved parking lots of this facility would not cause long-term effects to the stream because most of it is already channelized and degraded by the concrete-lined substrate. In addition, a stormwater management pond is proposed for the station to control nonpoint source pollution in the Difficult Run watershed. Therefore, long-term effects to this surface water resource and water quality are not anticipated.

No impacts to the other wetland systems are anticipated because Alignment T1 and associated facilities would not be located near those resources.

**Alignment T6, T9, or T9 Design Option.** Long-term effects on water resources from implementing Alignments T6, T9, or T9 Design Option would be identical to those described for Alignment T1.

**Alignment T4.** The long-term effects of implementing Alignment T4 would be identical to those described above for Alignment T1, except east of Park Run Drive. This section of the Metrorail alignment would cross an unnamed perennial stream (W-4) that is piped under Westpark Drive. Piers to support the Metrorail alignment would be placed away from the tributary; therefore, no long-term effects to the tributary are anticipated.

### Mid-Corridor

Thirteen wetland systems (W-10, W-11, W-12, W-13, W-14, W-15, W-16, W-17, W-18, W-20, W-60, W-61, and W-80) are located within the Mid-Corridor section. Effects to W-16, W-18, and W-80 are discussed below. No impacts to the other wetland systems named are anticipated.

Within this section of the study area, the Metrorail alignment would cross several second-order streams, including Courthouse Spring Branch, Wolftrap Creek, Difficult Run, and Sugarland Run. Streams within the Mid-Corridor also include tributaries to Sugarland Run and Horsepen Run Because the Metrorail alignment would be located within the median of the DAAR and because most streams, with the exception of Difficult

Run, have already been channeled under the DAAR and Dulles Toll Road, it is anticipated that the Metrorail Alternative would have minimal long-term effects on those streams.

At the Difficult Run crossing, a concrete section would be added to span the gap between the existing DAAR and the Dulles Toll Road bridge lanes over the stream. Piers would be placed within the 100-year floodplain of Difficult Run. However, the floodplain would not be affected by the placement of these piers, because they would be parallel to the existing piers. The Metrorail bridges are not anticipated to constrict the channel, or change the 100-year floodplain surface elevation. The proposed bridge structure, which would be located well above the floodplain elevation, would not affect on-site flooding. Off-site flooding risk would not change either because no change in floodplain elevation would be associated with the bridge piers. For these same reasons, it is anticipated that the new bridge crossings would result in minimal long-term effects to the RPA, floodplain, and EQC of Difficult Run.

The Metrorail alignment would cross the 100-year floodplain and the RPAs of Courthouse Spring Branch, Wolftrap Creek, and Sugarland Run. Because the floodplains of those streams are contained within the concrete-lined channels at the location of the proposed Metrorail bridges, and because the piers of these bridges would not be placed within the channels, no impacts to the floodplains associated with these waters would occur.

A proposed stormwater management pond would be located immediately west of W-16. The BMPs listed in *Virginia Erosion and Sediment Control Handbook*, including sediment and erosion control techniques are assumed to prevent bank failure during pond construction. Therefore, long-term effects to W-16 are not anticipated.

Another stormwater management pond would be located on a drainage ditch near the Dulles Toll Road ramp at Fairfax County Parkway. Stormwater from the drainage ditch is currently conveyed via a concrete-lined channel (W-18). Sedimentation from construction activities could affect the downstream sections of that channel. However, the impacts to downstream channel sections would be minimized with the implementation of proper erosion and sediment control measures during construction. In addition, because W-18 is concrete-lined, it is anticipated that the impacts to the stream would be minimal.

The long-term effects to a wetland system (W-80) at the proposed Herndon-Monroe Metrorail Station and Route 28 (W-61 and W-60) would be identical to those discussed above for Alignment BRT 1. Water quality in Difficult Run and Sugarland Run, the two streams that are monitored by VDEQ, would be minimally affected because of the limited amount of new impervious surface and pollution constituents that would enter these streams. In addition, the proposed stormwater management facilities at the Tysons West Station would improve downstream water quality in Difficult Run by controlling nonpoint source pollution originating in Tysons Corner.

Construction of the north and south facilities at Route 28 Station could affect the hydrology of wetland systems W-61 and W-60. However, BMPs, stormwater management, and sediment and erosion control in accordance with local, state, and federal regulations would ensure minimal indirect impacts. An EQC associated with W-61 would also be potentially affected. The project team is continuing coordination with Fairfax County to determine the extent of the EQC.

The potential parking structure to the west of the existing structure at the proposed Herndon-Monroe Station would be located on a temporary conservation easement. The plat map shows a temporary conservation easement through Parcel 27, property of Fairfax County Board of Supervisors, Hunter Mill District, Fairfax

County, Virginia. The area is described as a temporary conservation easement that shall remain valid until such time as property is developed with adequate stormwater management and BMP measures. The proposed west structure would cover a very small area of the easement. Adequate stormwater management facilities would be installed and appropriate BMP measures would be used during construction and operation of the facility.

Impacts to Chesapeake Bay Preservation Areas and EQC designations associated with Difficult Run and Sugarland Run are discussed above. Difficult Run, several miles downstream from the study area, is listed as an impaired stream in the *1998 303(d) Total Maximum Daily Load Priority List and Report*. The Metrorail Alternative would not alter this condition.

Proposed stormwater management facilities west of Centreville Road would be designed and constructed in compliance with FAA Circular 150/5200-33.

**Dulles Airport**

Eight wetland systems (W-OWA, W-FB/FBA/F, W-KKK, W-RIS, W-21, W-22, W-26, and W-62) are located within the Dulles Airport section of the study area. Horsepen Run and its tributaries, including Indian Creek, are the only surface water features within the Dulles Airport portion of the study area. Impacts to Horsepen Run and its water quality are discussed below.

Within this portion of the study area, the alignment would cross Horsepen Run in the median of the DAAR. A bridge would clear both the ditch and Horsepen Run on the south side of the DAAR. Piers would be placed on the banks of the stream, which would require the placement of permanent pier structures in the forested floodplain wetlands (W-FB/FBA/F) of Horsepen Run. The piers would affect 0.01 acre of this wetland system. Headward erosion could occur upstream of the site as erosion rates typically increase near bridge piers. The loss of buffer can cause downstream scour and channel entrenchment as water velocities increase during large storm events. Sediment retention would be reduced by removal of woody vegetation within the floodplain, causing an influx of sediment deposition. Mitigation measures are discussed in Section 4.2.7.

The crossing of the Horsepen Run stream corridor occurs on Dulles Airport property within Loudoun County. The *Loudoun County Revised General Plan* designates Horsepen Run as an RSCOD and a rail crossing would be allowed within the RSCOD for Horsepen Run when the environmental objectives of the RSCOD can be maintained or enhanced. Furthermore, BMPs, including stormwater management, would be implemented during bridge construction.

The floodplain of Horsepen Run would not be affected by the placement of new piers for the Metrorail bridge. The new piers would be parallel with the piers of the existing bridges. The Metrorail bridge is not anticipated to constrict the channel, or change the 100-year floodplain elevation. On-site flooding would not affect the proposed bridge structure, which would be located well above the floodplain elevation. Off-site flooding risk would not change because there would be no change in floodplain elevation associated with the bridge piers.

The tunnel segment for the Metrorail alignment would affect approximately 80 linear feet of a tributary to Horsepen Run (W-OWA). This portion of the alignment would require 60 feet of excavation to accommodate the tunnel. This would result in a permanent alteration of the stream's base flow—a substantial impact. The section of stream that would be affected by the tunnel is currently a ditch that conveys surface runoff from adjacent airport facilities. Mitigation measures are discussed in Section 4.2.7.

As the Metrorail alignment exits the western side of Dulles Airport property it would span Horsepen Run again and cross a forested wetland (W-RIS), resulting in displacement of 0.01 acre. Piers to support the aerial structure would be located within the 100-year FEMA and Loudoun County major floodplains of the stream. However, the piers would be designed and placed in compliance with the applicable local, state and federal regulations and to ensure that changes to the floodplain elevation do not occur. Therefore, it is not anticipated that the Metrorail Alternative would affect the floodplains.

As the Metrorail alignment exits Dulles Airport to enter the median of the Dulles Greenway, a bridge would span two portions of a perennial stream (W-26), resulting in minimal to no impacts.

Proposed stormwater management facilities in this portion of the study area would be designed and constructed in compliance with FAA Circular 150/5200-33.

#### Loudoun County

Ten wetland systems (W-23, W-24, W-25, W-50, W-51, W-Y1, W-Y2, W-Y3, W-Y4, and W-Y5) are located within the Loudoun County portion of the study area. Impacts to W-51 and W-23 would be the same as those discussed under the BRT Alternative. Impacts to the 100-year floodplain of Broad Run are discussed below. No impacts to the remaining wetland systems are anticipated.

Piers for the bridge extension over Broad Run would be placed within the 100-year floodplain. Despite the permanent pier structures, no further disturbance to the floodplain is anticipated because most of the area near the proposed bridge spans has already been cleared and graded to support existing bridge structures. Water quality in Broad Run would not be substantially altered because of the limited amount of new impervious surface area and pollution constituents that could enter Broad Run.

The facilities associated with Route 606 Metrorail Station, as proposed, encroach upon a small portion of the FEMA-designated and Loudoun County major floodplains of Broad Run.

Proposed stormwater management facilities in this portion of the study area would be designed and constructed in compliance with FAA Circular 150/5200-33.

#### S&I Yards

The S&I Yard proposed for Site 7 would encroach on the 100-year FEMA and major Loudoun County floodplains for Broad Run. In addition, a traction power substation (TP-22) and a tie-breaker station (B-14) would be located within this floodplain. Based on the "HEC River Analysis System Version 3" analysis of the Broad Run floodplain impact, the floodplain elevation would be raised 0.6 foot from the placement of the S&I Yard. This floodplain elevation impact is less than the 1.0-foot change that would be considered a significant floodplain impact. Therefore, impacts to the floodplain elevation would be considered less than significant. Flooding risk impacts, both on-site and off-site, would not be substantial. Because the change in floodplain elevation would be minimal, the potential for increased off-site flooding risks would be minimal. At Site 7, the facilities and trackwork would be located near a forested wetland (W-Y1) and Broad Run. Clearing and grading of forested land would be required to construct the facility and would increase the areas of impervious surface. However, a stormwater management facility would control runoff, thereby minimizing potential impacts to W-Y1 and Broad Run. This site is also within the FEMA-designated floodplain and the Loudoun County RSCOD associated with Broad Run. In accordance with the *Loudoun County Revised General Plan*, a rail crossing would be allowed within the RSCOD for Broad Run when the environmental objectives of the RSCOD can be maintained or enhanced. The removal of forested areas within the floodplain would slightly

reduce its beneficial uses, specifically those related to erosion and sediment control, wildlife habitat, and aesthetics. However, the BMPs listed in the *Virginia Erosion and Sediment Control Handbook* could be implemented to maintain the integrity of the RSCOD.

Seven wetland systems (W-MMMA, W-MMMB, W-MMMC/MMMD/MMME, W-MMMF, W-MMMG, W-MMMI/MMMJ, and W-MMMK) are located at Yard 15. Impacts to wetland systems W-MMMA, W-MMMB, W-MMMC1/MMMD, W-MMMG, and W-RIS (a large wetland system extending from the Mid-Corridor portion of the study area) are discussed below.

Where the yard lead enters Yard 15, approximately 0.25 acre of a forest wetland (W-MMMG) would be affected. Wetlands W-MMMA (0.20 acre) and W-MMMB (0.14 acre), located at the northwest portion of the yard, would be affected by the proposed parking area. Additionally, a portion of Wetland W-MMMC1/MMMD (0.02 acre) would have an impact due to the construction of Yard 15. Total wetland impacts from Yard 15 include 0.28 acre of palustrine forested wetlands and 0.34 acre of palustrine emergent wetlands. Site 15 and its yard lead would also affect a small portion of the 100-year floodplain of Horsepen Run. Piers would be placed on the banks of the stream, which would require the placement of permanent pier structures in the forested floodplain of W-RIS of Horsepen Run. The yard lead for Site 15 would also cross the RSCOD of Stallion Branch. Construction of bridge crossings would result in minimal disturbance to the streams and RSCOD because BMPs would be used, and the streams would be spanned.

Site 20 is located along the north side of Route 606 west of Mercure Circle, and south of the Dulles Greenway. Permission to access the site was not granted; therefore all Waters of the US were located using NWI and NRCS Soil Survey maps for Loudoun County until routine wetland delineation can be conducted. Based on these maps, it is not anticipated that the Site 20 would impact any wetlands or waterways within the proposed limits of disturbance.

The yard lead for Site 20 would cross Broad Run and parallel the north bank of the channel until the stream flows under the Dulles Greenway. New bridge structures and piers would be required at each crossing. Clearing and grading during construction of the yard lead track alignment would affect the 100-year floodplain of Broad Run, and cross Broad Run's RSCOD. Construction of bridge crossings would result in minimal disturbance to the streams and the RSCODs, because BMPs would be used and the streams would be spanned.

To mitigate these effects, adequate measures for control of erosion and sediment, stormwater management, and BMPs should be in accordance with the guidelines, policies, standards, and specifications contained in the *Public Facilities Manual*, and *Virginia Erosion and Sediment Control Handbook,* Chapter 104 (Erosion and Sediment Control) of the Fairfax County Code, and all other applicable requirements.

Proposed stormwater management facilities in this portion of the study area would be designed and constructed in compliance with FAA Circular 150/5200-33.

#### 4.2.4.4 BRT/Metrorail Alternative

The long-term effects on water resources from implementing the BRT/Metrorail Alternative from the existing Orange Line through Tysons Corner would be identical to those described in the Metrorail Alternative. West of Tysons West Station, the effects of the BRT/Metrorail Alternative would be identical to those of the BRT Alternative.

#### 4.2.4.5 Phased Implementation Alternative

The effects of the Phased Implementation Alternative would be the same as those identified above for the Metrorail Alternative with the following exception. Additional effects to a 100-year floodplain and the RSCOD in Loudoun County would occur if Site 14 were selected as the BRT Maintenance and Storage Facility. No water resources would be affected by the Spring Hill Road Station (Alignment BRT 1 only) or the ramps between the DAAR and the Tysons West Station (needed after Metrorail is extended through Tysons Corner).

### 4.2.5 CONSTRUCTION EFFECTS

The short-term construction effects of implementing the Baseline Alternative or one of the four Build Alternatives are discussed below.

#### 4.2.5.1 Baseline Alternative

Under the Baseline Alternative, there would be no construction-related effects to water resources from the Dulles Corridor Rapid Transit Project. However, there could be construction-related effects from the improvements assumed under this alternative. Identification of those effects is the responsibility of the agencies and jurisdictions implementing the improvements.

#### 4.2.5.2 BRT Alternative

No wetland systems would be in proximity to the proposed BRT facilities in the Orange Line Connection, Tysons Corner, or Dulles Airport portions of the project. Therefore, construction-related effects to water resources are not anticipated for those portions of the study area.

Within the Mid-Corridor portion of the study area, no construction-related effects are anticipated at the proposed Wiehle Avenue and Reston Parkway BRT stations and facilities because the stations would be located away from water resources.

During construction of the new parking structures at the Herndon-Monroe Station, the Route 28 Station facilities (under BRT 1 only), the Route 772 Stop, and the BRT Maintenance and Storage Facility, temporary increases in runoff and erosion from construction equipment and activities could occur. However, the BMPs identified in the *Virginia Erosion and Sediment Control Handbook* would be used to control stormwater runoff, sedimentation, and erosion; thereby minimizing potential negative effects on nearby water resources.

#### 4.2.5.3 Metrorail Alternative

The Metrorail Alternative would cross several streams that have already been piped under the Dulles Connector Road. It is not anticipated that construction-related activities would have any negative effects on these resources. But, some clearing of vegetation would be associated with construction of bridge extensions over Pimmitt Run, Difficult Run, Broad Run, Stallion Branch, and Horsepen Run. However, new piers would be placed in previously disturbed areas, in-line with the piers of existing highway bridges. In addition, some construction activities would also take place near or in wetlands.

Approximately 1.12 acres of wetland and floodplain would be cleared for construction of the S&I Yard at Site 20 (if selected). Because of the aerial nature of the yard lead in this area, it is likely that these impacts would be largely temporary and that the wetland would reestablish itself. The lead for Yard 15 would have a temporary

impact of 2.0 acres on Wetland W-RIS to allow for construction of the aerial structure. The temporary construction effects to this wetland system and its associated floodplain are anticipated to be minor.

To minimize the potential construction-related effects of the Metrorail Alternative, adequate measures for control of erosion and sediment, stormwater management, and BMPs should be in accordance with the guidelines, policies, standards, and specifications contained in the *Public Facilities Manual,* the *Virginia Erosion and Sediment Control Handbook,* Chapter 104 (Erosion and Sediment Control) of the Fairfax County Code, and all other applicable requirements. A sediment and erosion control plan would be submitted to the VDCR, VDEQ, and local jurisdictions for approval prior to construction. This plan would identify the BMPs that would be used to control sedimentation, erosion, and stormwater. The temporary construction effects to these streams and their associated floodplains are anticipated to be minor.

#### 4.2.5.4 BRT/Metrorail Alternative

Construction-related effects from implementing the BRT/Metrorail Alternative from the existing Orange Line through Tysons Corner would be identical to those discussed in the Metrorail Alternative. Construction-related effects to water resources from implementing the BRT/Metrorail Alternative west of Tysons Corner would be identical to those of the BRT Alternative.

#### 4.2.5.5 Phased Implementation Alternative

Construction of this alternative would involve the implementation of BRT and Metrorail over an extended period of time. Although the construction effects would be the same as those identified for the other three Build Alternatives, the timing would be different. The effects of constructing BRT from the Orange Line and to the terminus of the study area in Loudoun County would be added to the effects of constructing Metrorail through Tysons Corner. These effects would then be followed by the effects of constructing Metrorail from Tysons Corner to the terminus of the study area in Loudoun County.

### 4.2.6 MITIGATION

This section describes the mitigation measures for surface waters, water quality, wetlands, floodplains, critical areas, and hazardous wildlife attractants (at or near Dulles Airport).

#### 4.2.6.1 Surface Waters and Water Quality

Erosion and sediment control during construction would minimize surface water impacts associated with any of the alternatives. Stormwater management regulations administered by VDCR require that there be no net increase in peak discharge above the predevelopment condition. The BMPs listed in the *Virginia Erosion and Sediment Control Handbook* for engineering, stormwater management, and erosion control would be implemented for the selected alternative in order to retain and renovate stormwater in conjunction with the Commonwealth requirements. Such BMPs would minimize clearing, control erosion, and stabilize exposed areas. Prior to construction, a project sediment and erosion control plan would be prepared and submitted to VDCR, VDEQ, and local jurisdictions for approval.

Bridges that span a stream or tributary and concrete-lined streams that are converted to pipe(s) would have no permanent effects; therefore, mitigation would not be required. There would, however, be permanent effects for streams with natural substrate that are converted to culverts or pipes. Two tributaries, W-OWA and W-51, would be potentially affected. Measures available to mitigate these effects in the form of water quality improvements include:

- Stormwater retrofits within the watershed of the affected tributary,
- Riparian buffers planted near the affected area, or
- Enhancing aquatic habitats by removing fish blockages.

Out of kind mitigation is also available for stream impacts, which includes buying credits in a local or regional wetland bank related to the linear feet of the effected stream. Mitigation banking is further discussed in Section 5.2.4.2.

#### 4.2.6.2 Wetland Systems

Section 404 of the Clean Water Act provides regulatory authority to the USACE to issue or deny permits for the discharge of dredged or fill material into waters of the United States, including special aquatic sites (e.g., wetlands, mud flats, riffle pool complexes, and vegetated shallows). Appropriate and practicable compensatory mitigation is required for unavoidable adverse impacts to aquatic resources. In determining compensatory mitigation, the functional values lost by the affected resource must be considered in developing the goals of the mitigation plan.

Complete avoidance of impacts to waters of the United States, including wetlands, is not practicable for any of the Build Alternatives due to the proximity of the existing park-and-ride lots and land for transit stations to wetlands. Minor impacts could occur from bridge support piers, construction of stations and facilities, and stormwater management outfalls. However, as part of the planning and preliminary design processes, modifications and refinements to each alternative were undertaken to avoid or minimize impacts. Table 4.2-5 details the acreages of wetland systems that would be affected by the implementation of the project, and the amount (based on regulated ratios) of wetlands proposed for mitigation. BMPs would be employed during construction of stations, stops, and ancillary facilities and operation of BRT or Metrorail to minimize any potential effects to wetland systems.

**Table 4.2-5: Proposed Wetland Mitigation**

| Wetland Number | Cowardin System Class | Wetland (acres) | Replacement Ratio* |
|---|---|---:|---:|
| **BRT Alternative** | | | |
| W-80 | Palustrine Emergent Wetland | 0.12 | 1:1 |
| W-51 | Palustrine Emergent Wetland | 0.46 | 1:1 |
| TOTAL | | 0.58 | |
| **Metrorail Alternative** | | | |
| W-80 | Palustrine Emergent Wetland | 0.12 | 1:1 |
| W-FB/FBA/F | Palustrine Forested Wetland | 0.01 | 2:1 |
| W-RIS | Palustrine Forested Wetland | 0.01 | 2:1 |
| W-51 | Palustrine Emergent Wetland | 0.46 | 1:1 |
| W-MMMA | Palustrine Emergent Wetland | 0.20 | 1:1 |
| W-MMMB | Palustrine Emergent/Forested Wetland | 0.14 | 1:1 |
| W-MMMCI/ MMMD | Palustrine Emergent/Forest Wetland | 0.02 | 2:1 |
| W-MMMG | Palustrine Forested Wetland | 0.25 | 2:1 |
| W-RIS | Palustrine Forested | 0.01 | 2:1 |
| TOTAL | | 0.60 – 1.22[1] | |

* USACE has established replacement ratios for wetlands only.
1 Total wetland impacts anticipated to be 0.60 acres if Metrorail S&I Yard Sites 7 or 20 are selected. Impacts could reach as high as 1.22 acres if Metrorail S&I Yard Site 15 is selected.

Compensatory mitigation, especially restoration or creation of wetlands and waterways to compensate for the loss of wetland and waterway functions and values, is the final step in the wetland mitigation process. Compensatory actions should be undertaken, when practicable, in areas adjacent or contiguous (on-site compensatory mitigation) to the study area. If on-site compensatory mitigation is not practicable, off-site mitigation should be undertaken in the same watershed, if possible. The following are compensation measures, in order of preference:

- Restoration of wetlands that have been converted to uplands;
- Creation of new wetlands from uplands;
- High-ratio enhancement of degraded wetlands;
- High-ratio preservation of existing wetlands and adjacent upland buffers; and
- Restoration of degraded stream channels where applicable.

VDEQ and USACE are currently developing guidance to deal with mitigation measures for waterway impacts. At this time, specific measures have not been adopted, and mitigation for waterway impacts is done on a project-by-project basis.

The USACE guidance on appropriate replacement ratios for restoration and creation recognizes that the opportunity to replace the functions and values of the affected wetlands and waterways at the proposed mitigation site should be used to develop appropriate mitigation ratios.

Typically, the USACE requires a 1:1 ratio (creation area to impact area) for the replacement of emergent wetlands; and a 2:1 ratio for scrub-shrub and forested wetlands to meet no net loss of wetland functions and values associated with wetland systems. The replacement ratio may be adjusted at the discretion of USACE depending on the wetland's functions and values. High-ratio enhancement and preservation is not preferred over restoration or creation except in unusual circumstances. Enhancement may occur at a ratio of 3:1 or greater, and preservation may occur at a ratio of 10:1 or greater. Mitigation banking in some cases also could be an acceptable form of compensatory mitigation under specific criteria designed to ensure an environmentally successful bank. Mitigation banking is "the restoration, creation, enhancement, and (in exceptional circumstances) preservation of wetlands and/or other aquatic resources, expressly for the purpose of providing compensatory mitigation in advance of authorized impacts to similar resources. In addition to the specified compensation ratios and acreage, the mitigation process would incorporate the following goals:

- Continue to minimize wetland impacts during final design.
- Replace principal wetland functions and values within the same watershed as the wetland impact.
- Implement wetland mitigation before impacts are completed to allow early evaluation of mitigation success in replacing functions and values.
- Preserve existing wetlands and buffers when proposed mitigation site does not provide all functions.

#### 4.2.6.3 Floodplains

Development in a floodplain is regulated at federal, state, and local levels. Executive Order 11988, *Floodplain Management* and the National Flood Insurance Act of 1968, as amended, require federally funded projects to avoid or minimize encroachment within a 100-year floodplain, where practicable. For transportation projects, U.S. DOT has established policies and procedures (Order 5650.2, *Floodplain Management and Protection*) for ensuring that proper consideration is given to avoid and mitigate floodplain impacts.

Floodplain management measures have also been developed by VDCR, VDEQ, and by local agencies pursuant to stormwater management ordinances. These measures are designed to reduce encroachment on floodplains and avoid flood hazards.

In subsequent stages of the project, plans would be reviewed with the applicable agencies and all the facilities located within floodplains would be designed to comply with the federal, state, and local regulations. Facilities proposed to be located within floodplains must be designed to prevent changes in floodplain elevations of one foot or more.

#### 4.2.6.4 Critical Areas

Stream corridor policies adopted in the *Fairfax County Comprehensive Plan* and *Loudoun County Revised General Plan* provide some level of protection for the streams that would be crossed by the project. In most cases, these project-related crossings would not substantially alter the course, current, or cross-section of the streams. The proposed new crossing of Horsepen Run and wetland complex would require review by Loudoun County for consistency with the Comprehensive Plan policies to protect water quality and habitat. The project team will coordinate with Loudoun County regarding mitigation for the nonconformity of any of the project elements with the Loudoun County RSCOD for Broad Run.

#### 4.2.6.5 Hazardous Wildlife Attractants At or Near Airports

Where stormwater management ponds and wetland mitigation projects alter the habitat of potentially hazardous wildlife, and fall within 10,000 feet of Dulles Airport's aircraft movement areas, loading ramps, or aircraft parking areas, FAA recommendations, as outlined in FAA Advisory Circular No. 150/5200-33 for construction and maintenance, would be followed.

To control hazardous wildlife, FAA recommends using steep-sided, narrow, linearly shaped, rip-rap lined, water detention (or "dry") basins rather than traditional retention basins. When possible, these ponds should be placed away from aircraft movement areas to minimize aircraft-wildlife interactions. For stormwater management ponds and wetland mitigation that are located outside the 10,000-foot criteria, FAA would be consulted to determine if such changes present potential wildlife hazards to aircraft operations within five miles of aircraft movement areas, loading ramps, or aircraft parking areas. If necessary, wildlife damage management biologist could evaluate wetland mitigation projects that could attract hazardous wildlife, and a wildlife damage management plan could be developed to reduce wildlife hazards.

Coordination with FAA and MWAA will continue to ensure project plans would meet the requirements of the FAA Advisory Circular.

### 4.2.7 SUMMARY OF EFFECTS

A summary of the effects to water resources discussed above is presented in Table 4.2-6.

**Table 4.2.6: Summary of Water Resources Effects**

| Alternative | Effects to Water Resources | Mitigation |
|---|---|---|
| Baseline | None | None |
| BRT | Wetlands Displaced – W-80 (0.12 acre), W-51[1] (0.46 acres)<br>Stream Effects – None<br>100-Year Floodplain Modifications[2] – None | BMPs, erosion and sediment control, compensatory wetland mitigation, prevention of changes in floodplain elevation through design, coordination with Loudoun County. |

| Alternative | Effects to Water Resources | Mitigation |
|---|---|---|
| | 100-Year Floodplain Affected[3] – W-61, W-25<br>Proximity Effects[4] – Pimmit Run (W-2), W-60[5], W-61, W-23, W-Y5<br>CBPA, EQC[6] – W-61 | |
| Metrorail | Wetlands Displaced – W-80 (0.12 acre), W-RIS (0.01 acre), W-51[1] (0.46 acre), W-MMMA (0.20 acre)[7], W-MMMB (0.14 acre)[7], W-MMCI/MMD (0.02 acre)[7], W-MMMG (0.25 acre)[7], W-RIS (0.01 acre)[7]<br>Stream Effects – Tributary to Horsepen Run (Alteration of Base Flow along 80 linear feet), W-15 (Potential effect due to new crossing along 96 linear feet)<br>100-Year Floodplain Modifications[2] – Broad Run (W-25)<br>100-Year Floodplain Affected[3] – Pimmit Run (W-2), Scotts Run (W-4), Difficult Run (W-13), W-61, W-25<br>Proximity Effects[4] – Pimmit Run (W-2), W-4, Difficult Run (W-13), Sugarland Run (W-17), W-18, W-FB/PBA/F, W-60, W-61, W-26, W-Y1, W-Y5<br>CBPA, EQC, RSCOD[6] – Pimmit Run (W-2), Scotts Run (W-4), W-61, W-RIS, Broad Run (W-25) | BMPs, erosion and sediment control, compensatory wetland mitigation, prevention of changes in floodplain elevation through design, coordination with Loudoun County. |
| BRT/Metrorail | Wetlands Displaced – W-80 (0.12 acre), W-51[1] (0.46 acres)<br>Stream Effects – None<br>100-Year Floodplain Modifications[2] – None<br>100-Year Floodplain Affected[3] – Pimmit Run (W-2), Scotts Run (W-4), W-61, W-25<br>Proximity Effects[4] – Pimmit Run (W-2), Unnamed Tributary (W-4), W-60[5], W-61, W-23, W-Y5<br>CBPA, EQC[6] – Pimmit Run (W-2), Scotts Run (W-4), W-61 | BMPs, erosion and sediment control, compensatory wetland mitigation, prevention of changes in floodplain elevation through design, coordination with Loudoun County. |
| Phased Implementation | Wetlands Displaced – W-80 (0.12 acre), W-RIS(0.01 acre), W-51[1] (0.46 acre), W-MMMA (0.20 acre)[7], W-MMMB (0.14 acre)[7], W-MMCI/MMD (0.02 acre)[7], W-MMMG (0.25 acre)[7], W-RIS (0.01 acre)[7]<br>Stream Effects – Tributary to Horsepen Run (Alteration of Base Flow along 80 linear feet), W-15 (Potential effect due to new crossing along 96 linear feet)<br>100-Year Floodplain Modifications[2] – Broad Run (W-25)<br>100-Year Floodplain Affected[3] – Pimmit Run (W-2), Scotts Run (W-4), Difficult Run (W-13), W-61, W-25<br>Proximity Effects[4] – Pimmit Run (W-2), W-4, Difficult Run (W-13), Sugarland Run (W-17), W-18, W-FB/PBA/F, W-60, W-61, W-26, W-Y1, W-Y5<br>CBPA, EQC, RSCOD[6] – Pimmit Run (W-2), Scotts Run (W-4), W-61, W-RIS, Broad Run (W-25) | BMPs, erosion and sediment control, compensatory wetland mitigation, prevention of changes in floodplain elevation through design, coordination with Loudoun County. |

1 Effect occurs only if the North Option for the Route 772 Stop/Station is selected.
2 Effect involves 0.6-foot increase in 100-Year Floodplain Elevation.
3 Floodplain affected, but no increase in floodplain elevation is anticipated.
4 Proximity to construction could alter the hydrology and/or function of water resource.
5 Effect occurs only if BRT 1 is selected.
6.Construction would occur within Environmental Quality Corridor (EQC), Chesapeake Bay Preservation Area (CBPA), or in Loudoun County's River and Stream Corridor Overlay District (RSCOD) as detailed in table.
7 Effect occurs only if Metrorail S&I Yard Site 15 is selected.

## 4.3 AQUATIC BIOTA AND HABITAT

This section provides a description of the aquatic resources in the study area including the biota (regional flora and fauna) and habitat. Aquatic biota are creatures and plants that live in water. The effects upon these resources that could result from the project are described, as well as the proposed measures to mitigate these effects. For ease of discussion, these resources are described as they occur in five geographic sections of the Dulles Corridor, running from east to west. Additional information regarding aquatic biota and habitat is provided in the *Natural Resources Technical Report* (June 2002).

### 4.3.1 LEGAL AND REGULATORY CONTEXT

Aquatic habitats could be protected under a variety of regulations that limit their use or destruction. A detailed discussion of the aquatic habitats protected under Section 404 of the Clean Water Act can be found in Section 4.2. In addition, VDGIF regulates non-endangered wildlife at the state level. Plant and animal species whose populations have declined to a point where extinction is imminent are afforded protection under federal and state laws. These species are discussed in more detail in Section 4.5.

### 4.3.2 METHODOLOGY

Aquatic biota and habitat within the study area were assessed by reviewing color aerial photographs flown in the spring of 2000 and by conducting a field reconnaissance from December 2000 to February 2001. Aquatic habitat was characterized within 300 to 2,000 feet of the proposed locations of alternatives. The study area varied depending on the types of proposed facilities (e.g., stations, maintenance and storage facilities and construction staging areas).

Available data, supplemented by field observations, were used to characterize the aquatic biota and habitat in the study area. Aquatic wildlife species encountered during fieldwork for the project were identified and documented. Data regarding general land use, stream origin and type, summary of riparian vegetation features, and measurements of in-stream parameters such as width, depth, flow and substrates were assessed to understand the health of the aquatic community. This qualitative assessment was supplemented with information obtained from federal, state, and local agencies, which identified conditions within these habitats specific to the study area.

Agencies including the VDEQ, USGS, VDCR, Virginia Department of Agriculture and Consumer Services (VDACS), Fairfax County Department of Health, Virginia Department of Public Works and Environmental Services, Northern Virginia Soil and Water District, and Fairfax and Loudoun County health departments were contacted to obtain existing ambient and biological water quality data for streams within the study area.

A baseline study conducted in 1999 by Fairfax County's Department of Public Works and Environmental Services under the Stream Protection Strategy program was used to assess the watersheds of Pimmit Run, Middle Potomac, Difficult Run, and Sugarland Run. During the study macroinvertebrates (animals visible without magnification and having no backbone) and fish were sampled. Data collected from this study, in combination with field observations, were used to evaluate in-stream habitat of surface waters within the study area.

Potential impacts to aquatic biota and habitat from the proposed project were also assessed using an overlay analysis of project alternatives with the existing resources. For aquatic habitat and its corresponding wildlife, a potential impact is defined as one that would permanently alter the hydrology or biological structure of an aquatic community.

### 4.3.3 EXISTING CONDITIONS

As shown in Figure 4.2-1 of Section 4.2, the Middle Potomac-Catoctin and Middle Potomac-Anacostia-Occoquan watersheds traverse the Dulles Corridor and are part of the Potomac-Shenandoah River Basin. The study area lies entirely within this basin. A total of nine major streams and their contributing tributaries bisect the Dulles Corridor, including Pimmit Run, Scotts Run, Courthouse Spring Branch, Wolftrap Creek, Difficult Run, Sugarland Run, Indian Creek, Horsepen Run, and Broad Run.

Perennial and intermittent non-tidal streams provide most of the aquatic habitat throughout the project corridor. There are also a few ephemeral streams, which are defined as having flowing water only during and for a short duration after precipitation events in a typical year, with no groundwater influence. These streams serve as an aquatic habitat for some biota on a seasonal basis.

Non-tidal waters are restricted to both modified/natural stream channels and ponds. Most of the ponds within the corridor are used for stormwater management in areas of intense development such as Tysons Corner or in recently developed areas within the Mid-Corridor activity centers. Most of the ponds observed in Loudoun County were once used for agricultural purposes and are now being used to manage stormwater at construction sites and new developments.

#### 4.3.3.1 Orange Line Connection

Within this portion of the study area, Pimmit Run and its tributaries provide most of the aquatic habitat. Studies conducted by Fairfax County rated the habitat in Pimmit Run as poor due to its intensely developed watershed. Channelized stream sections, sediment deposition, and unstable sediment bars typify the habitat throughout the stream. In addition, intense development has degraded bank stability and riparian zone quality.

Aquatic species observed in Pimmit Run include American eel, white sucker, blacknose dace, creek chub, and redbreasted sunfish.

#### 4.3.3.2 Tysons Corner

The Scotts Run stream system traverses the study area near Tysons Corner and several small ponds provide stormwater management functions for commercial complexes and townhouse communities in Tysons Corner.

Studies conducted by Fairfax County found that overall quality for the stream was "poor" or "very poor." Although some reaches of Scotts Run possess high-quality habitat, the macroinvertebrate and fish communities observed did not support this finding. Species observed in Scotts Run include bluegill, blacknose dace, creek chub, largemouth bass, longnose dace, and white sucker. The Scotts Run water quality impairment is attributed to adjacent land use, where more than 40 percent of the land area is impervious.

Most of the ponds in Tysons Corner are in the headwaters of tributaries to Scotts Run. The wetland fringe associated with many of these ponds provides suitable breeding grounds for frogs, dragonflies, and turtles. Wildlife species diversity is limited by the surrounding land use.

#### 4.3.3.3 Mid-Corridor

Several large, second-order streams including Courthouse Spring Branch, Wolftrap Creek, Difficult Run, Sugarland Run and its tributaries, and tributaries to Horsepen Run provide the aquatic habitat in this portion of the study area. Several stormwater management ponds are also situated in this portion of the corridor, especially near new development along the DAAR/Dulles Toll Road. Although Courthouse Spring Branch has not been studied by Fairfax County, it can be compared to the assessment of Difficult Run. In addition, a qualitative assessment of habitat was made during the field review for this project. Species composition for fish in Courthouse Spring Branch is expected to be more diverse than that found in Difficult Run due to its gravel substrate and the frequent riffle/pool sequence and its surrounding wooded land use. According to Fairfax County, Wolftrap Creek has poor habitat and a low to fair range of fish species. The low rating was attributed to high impervious cover in its headwaters.

Fairfax County rated the habitat of Difficult Run "good" upstream of the DAAR and "fair" downstream of the DAAR. The habitat of Sugarland Run was rated "fair" by Fairfax County as a result of sediment deposition and embeddedness. The highly degraded condition of this system was attributed to land use in the watershed: intense development and high levels of impervious cover. Species observed in these streams include roseyside dace, longnose dace, blacknose dace, tessellated darter, central stoneroller, common shiner, creek chub, white sucker, bluegill, American eel, swallowtail shiner, bluntnose minnow, and yellow bullhead.

The Metropolitan Washington Council of Governments conducted an extensive study of Sugarland Run and its tributaries. Under Phase I of the *Rapid Stream Assessment Technique (RSAT) Survey of the Sugarland Run Watershed* (May 1997), the Sugarland Run main stem was surveyed to evaluate physical, chemical, and biological stream quality. During the study, 13 stream segments were rated for channel stability, channel scouring and sediment deposition, physical instream habitat, water quality, riparian habitat, and biological indicators. The overall RSAT stream quality rating for the Rosedown Drive to Dulles Toll Road and Dulles Toll Road to Eklen Street study segments rated "fair." The water quality parameter for those two stream segments rated "fair" and "poor", respectively.

Under Phase II of the *RSAT Survey of Sugarland Run Watershed* (March 1999), a total of 30 streams (13 major and 17 feeder tributaries) to Sugarland Run were evaluated using the same parameters used during the Phase I survey. Under the RSAT ranking system, 73 percent of the tributaries had an overall rating of "fair", while 27 percent rated "good." No stream was rated "poor" or "excellent" overall.

The ponds in the Mid-Corridor are isolated systems designed specifically for stormwater management within commercial complexes and in areas of new construction. Habitat is limited in these ponds due to surrounding land use, which consists of a high percentage of impervious surfaces and lacks vegetation and landscaping. Species diversity in the ponds is very limited by lack of cover and turbid conditions, but typically includes frogs, dragonfly larvae, and fish that have been stocked.

In addition to the common species in the Mid-Corridor discussed above, VDCR provided recent records of the state-threatened wood turtle (*Clemmys insculpta*) from Difficult Run near the study area. Another record of wood turtle exists for Sugarland Run in Loudoun County, but well outside of the study area. A more detailed discussion on this species is presented in Section 4.5.

#### 4.3.3.4 Dulles Airport

The surface waters identified in this segment of the corridor include the main stem of Horsepen Run and its six tributaries. A total of five tributaries flow through the Dulles Airport segment to join Horsepen Run, while the

other tributary flows into Indian Creek. One of the larger tributaries to Horsepen Run includes Stallion Branch, which enters the main stem of Horsepen Run just before it flows under Route 606 to join Broad Run. Horsepen Run is classified as a lower perennial stream with a silt substrate that flows along the south side of the Dulles Toll Road within airport property. The average width of Horsepen Run is 22 feet with a channel depth of 3.5 feet.

The main stem of Horsepen Run is relatively stable throughout its length, except where it flows through undersized culverts, and where localized erosion and silt deposition occurs. A portion of Horsepen Run, known as Horsepen Lake, has been backwatered due to the Route 606 roadway embankment that acts as a dam in this area. The portion of Horsepen Run that flows along the south side of the Dulles Toll Road has been stabilized with rip-rap along the banks, approximately 200 feet upstream of the Dulles Greenway crossing to prevent highway bridges from being undermined by the stream. Tributaries originating within the airport property are channelized in their headwaters due to the removal of the buffer to accommodate runway and parking facilities. A headwater tributary of Horsepen Run is classified as a perennial stream with a sand substrate. It begins north of Wind Sock Drive and flows northwest to Dulles Lake.

A Fairfax County study rated Horsepen Run's habitat as "fair" because portions of the stream throughout Dulles Airport are experiencing localized erosion and increased silt deposition near undersized road culverts. In addition, the forested stream buffer has been cleared in some areas for maintenance of access roads and property rights-of-way, reducing sediment retention. Active channel widening, down-cutting, moderate to severe erosion, and unstable banks characterize sections of the stream along the Dulles Toll Road. Macroinvertebrate populations contained few intolerant species, or "sensitive organisms", signifying degraded conditions and poor instream habitat. Fish taxa richness ranked low, consisting of pollution-tolerant species such as white sucker, green sunfish, creek chub, blacknose dace, and yellow bullhead.

Dulles Lake serves as the primary stormwater management facility for Dulles Airport. Species diversity is limited in this area because the size of the tributary to Horsepen Run does not allow fish migration into the lake. Therefore, species abundance is low and dependent on the types of fish stocked in the lake. The lake also contains an upland island that provides habitat to waterfowl. Bird species observed during field study included ring-necked duck, mallard, ring-billed gull, and Canada goose. These species are mainly herbivores that feed on the vegetation along the fringes of the lake.

#### 4.3.3.5 Loudoun County

Broad Run and its tributaries, farm ponds, and a vernal pool provide an aquatic habitat within this portion of the study area.

The project team conducted a qualitative assessment of the habitat provided by Broad Run during the field review. Deep pools and long runs provide most of the in-stream habitat. Large amounts of sand have been deposited in the pools and runs from construction occurring upstream and near the Dulles Greenway crossing. Fish typically found in streams with a sand substrate include pumpkinseed, yellow bullhead, largemouth bass, and longnose dace.

Farm ponds that previously supported agriculture in the study area now serve as sediment traps for the new construction occurring around them. Most of these ponds are isolated systems that were stocked at one time with species such as pumpkinseed, yellow bullhead, largemouth bass, and bluegill. These areas also provide breeding areas for dragonflies, peepers, bullfrogs, spotted salamanders, and wood frogs.

The vernal pool south of the Dulles Greenway near the terminus of the Dulles Corridor provides breeding habitat for spotted salamanders and wood frogs. Spotted salamanders and wood frogs are upland species that migrate to vernal pools only for breeding. Once the larvae mature, these species migrate to their upland habitat.

### 4.3.4 LONG-TERM EFFECTS

The long-term effects to aquatic biota and habitat from the proposed implementation of the Baseline and Build alternatives are discussed below. For aquatic habitat and its corresponding wildlife, a potential impact is defined as one that would permanently alter the hydrology or biological structure of an aquatic community. Long-term effects to aquatic biota and habitat are not anticipated to occur if BMPs are implemented to control erosion, sedimentation, and stormwater runoff.

#### 4.3.4.1 Baseline Alternative

Under the Baseline Alternative, there would be no effects to aquatic biota and habitat from the Dulles Corridor Rapid Transit Project. However, there could be effects from the improvements assumed under this alternative. Identification of these effects is the responsibility of the agencies and jurisdictions implementing the improvements.

#### 4.3.4.2 BRT Alternative

Because a majority of BRT stations, stops, and facilities would be located within developed areas away from aquatic habitats and BRT vehicles would use existing roadways, minimal long-term effects to aquatic biota and habitat are anticipated.

##### Orange Line Connection

No effects to aquatic biota and habitat are anticipated.

##### Tysons Corner

No effects to aquatic biota and habitat are anticipated.

##### Mid-Corridor

No long-term effects to aquatic biota and habitat are anticipated as a result of constructing and operating the Wiehle Avenue and Reston Parkway stations. Minor effects would potentially occur at the Herndon-Monroe and Route 28 stations, as detailed below.

At Herndon-Monroe, the existing park-and-ride facility is located adjacent to a stormwater management pond. The pond currently offers marginal aquatic habitat. This condition is likely to remain unchanged when the new station facilities are in place. Two additional parking structures are proposed adjacent to the existing garage. The new facilities would displace an emergent wetland (W-80). The new garages would be designed to minimize the impacts on the aquatic biota and ecology afforded by the wetlands. Permanent effects on the biological structure and hydrology of the wetlands would occur. Mitigation measures to compensate for this impact are discussed in Section 4.2.7.

At Route 28, station facilities would be located immediately north of a forested wetland associated with an unnamed tributary (W-61). Construction of such facilities could change the hydrology and biological structure of the wetland. However, a stormwater management pond is planned at this location to control stormwater runoff and minimize changes to the hydrology and biology of the aquatic habitat. Furthermore, BMPs would

be used during construction to control sediment, erosion, and stormwater. As a result, it is anticipated that long-term effects to aquatic biota and habitat would be minimal.

#### Dulles Airport
No aquatic habitat exists in the vicinity of the proposed BRT stop.

#### Loudoun County
Two options are under study for the BRT Stop at Route 772. Under the northern option, the stop's facilities would be located north of the Dulles Greenway, surrounding an intermittent tributary (W-51) to Broad Run and associated emergent wetland. The northern option would directly affect 50 linear feet of the tributary because the stream would most likely be piped under a planned access road for the facilities. Because most of the tributary has already been placed in a concrete-lined ditch to convey surface runoff, it is anticipated that there would not be any long-term effects to the biological structure and hydrology of the tributary and Broad Run would be minimal.

A forested wetland is located at the southeastern edge of the proposed BRT Maintenance and Storage Facility site (Site 14). Clearing and grading of forested land would be required to construct the BRT facility and would increase the areas of impervious surfaces. However the facility would not encroach upon the wetland, and stormwater and sediment/erosion control and other BMP measures would be used during construction to minimize the impact on aquatic biota and habitat.

### 4.3.4.3 Metrorail Alternative
The Metrorail Alternative is comprehensively described in Section 2.3.2.

#### Orange Line Connection
North of the Dulles Connector Road and I-66 interchange, the Metrorail alignment crosses an unnamed perennial stream (W-2) that is piped under the Dulles Connector Road and Pimmit Run. These crossings would not affect the biological structure of aquatic communities.

North of the Pimmit Run Crossing, a tie-breaker station (B-3) would be located near a flume that directs road runoff. Because the structure is concrete-lined, no effects to aquatic biota and habitat are anticipated.

#### Tysons Corner
Within this portion of the study area, no long-term effects to aquatic biota and habitat are anticipated as most of the Metrorail stations and facilities would be located in developed areas away from aquatic habitats.

#### Mid-Corridor
The Metrorail alignment would cross several second-order streams, including Courthouse Spring Branch, Wolftrap Creek, Difficult Run, and Sugarland Run. With the exception of Difficult Run, all of these streams have been transformed to culverts under the DAAR/Dulles Toll Road. Because these streams are channelized and the new Metrorail alignment would be located within the median of the DAAR, it is anticipated that the Metrorail Alternative would have minimal long-term effects on aquatic biota and habitat. Permanent stormwater management ponds would be located along the DAAR/Dulles Toll Road to replace the grassy swales that are currently in the median of the DAAR. These ponds would add a marginal amount of aquatic habitat to the study area. More detailed information regarding the potential effects to the wood turtle is presented in Section 4.5.

The long-term effects of the addition of Metrorail stations at Herndon-Monroe and Route 28 are identical to those discussed above for the BRT Alternative.

### Dulles Airport

The Metrorail alignment in this portion of the study area would cross Horsepen Run within the median of the DAAR. Minor effects to aquatic biota and habitat are anticipated.

The tunnel segment for the Metrorail alignment would affect approximately 80 linear feet of a tributary to Horsepen Run. This portion of the alignment would require 60 feet of excavation to accommodate the tunnel. The hydrology of the stream would be permanently altered from the displacement of base flow. Macroinvertebrates and fish in this portion of the stream would be permanently displaced due to alteration of channel substrate and morphology.

A small amount of aquatic habitat would be displaced by the Metrorail alignment as it exits the airport to enter the median of the Dulles Greenway. Because the alignment is aerial in this section, the amount of habitat displaced would be very small. It is not anticipated that placement of piers in this area would permanently alter the hydrology or biological structure of the aquatic community associated with these wetlands.

### Loudoun County

The long-term effects on aquatic biota and habitat from the addition of a Metrorail station at Route 772 would be identical to those discussed above for the BRT Alternative.

Some long-term effects to the aquatic structure of Broad Run and its tributary would occur as a result of clearing the forested tracts and floodplain that help retain sediment during storm events. Erosion rates would likely be higher for areas left unpaved. In addition, the introduction of impervious surface could result in increased water velocity of runoff entering Broad Run and its tributary. These effects would be minimized by using BMPs during construction to control stormwater, sedimentation, and erosion. In addition, a stormwater detention pond is proposed to control non-point source pollution and stormwater runoff from the site. The design of the detention pond, as discussed in Section 4.2, would be consistent with FAA Advisory Circular No. 150/5200-33 to ensure hazardous wildlife control.

At the proposed Metrorail S&I Yard at Site 7, the facilities and track would be located near a forested wetland (W-25) within, 100-year FEMA floodplain and Loudoun County's major floodplain of the RSCOD. Section 4.2 presents detailed discussion of the long-term effects to FEMA and county-designated floodplains.

The proposed yard lead for Site 15 would span both Stallion Branch and Horsepen Run near their confluence. Significant long-term impacts are not anticipated for either stream due to a bridge span at these crossings. The riparian buffer has been displaced or removed near the confluence, reducing the amount of woody vegetation that needs to be removed during the construction of the bridge. It is likely that the track alignment would not affect the existing water quality conditions at the Horsepen Run/Stallion Branch crossing, therefore the aquatic biota and habitat would not be affected.

The yard lead for proposed S&I Yard Site 20 would cross Broad Run and parallel the north bank of the channel until the stream flows under the Dulles Greenway. A new bridge structure at the crossing would increase erosion rates in and around the bridge. Bank failure could occur along the north side of the stream where woody vegetation would be removed to accommodate the track, destabilizing banks that are currently protected by the riparian buffer. In-stream construction may occur as the stream banks are stabilized with rip-rap to

prevent the track from being undermined. Increased sediment loads are anticipated during and after construction, which would reduce the available habitat for fish and macroinvertebrate refugia.

#### 4.3.4.4 BRT/Metrorail Alternative

The effects of implementing BRT/Metrorail from the existing Orange Line through Tysons Corner are identical to those effects discussed in the Metrorail section above for that geographic area. West of Tysons West Station, the effects of the BRT/Metrorail Alternative would be identical to those of the BRT Alternative.

#### 4.3.4.5 Phased Implementation Alternative

The effects of the Phased Implementation Alternative would be the same as those identified for the Metrorail Alternative. No additional effects over those identified for the Metrorail Alternative would result from first implementing BRT or from the removal of BRT related-facilities.

### 4.3.5 CONSTRUCTION EFFECTS

The short-term construction effects of implementing either the Baseline Alternative or one of the four Build Alternatives are discussed below.

#### 4.3.5.1 Baseline Alternative

Under the Baseline Alternative, there would be no construction-related effects to aquatic biota and habitat from the Dulles Corridor Rapid Transit Project. However, there could be construction-related effects from the improvements assumed under this alternative. Identification of those effects is the responsibility of the agencies and jurisdictions implementing the improvements.

#### 4.3.5.2 BRT Alternative

The construction-related effects of this alternative on aquatic habitat could include short-term noise and vibration, air pollution, and temporary increases in runoff and erosion from construction equipment and activities. Construction effects would be minimized by compliance with local ordinances and use of BMPs.

#### 4.3.5.3 Metrorail Alternative

The construction-related effects of the Metrorail Alternative on aquatic habitat could include short-term noise and vibration, air pollution, and temporary increases in runoff and erosion from the construction equipment and activities. Construction effects would be minimized by compliance with local ordinances and use of BMPs. In addition, temporary effects to aquatic habitat would occur at Dulles Airport in the area where the alignment departs the airport roadway to enter the median of the Dulles Greenway. Temporary access paths would be cleared so that the piers for the aerial alignment can be constructed. Additional construction-related effects to aquatic habitat would occur at areas where yard leads would cross streams and wetlands for S&I Yard Sites 15 and 20, if selected.

#### 4.3.5.4 BRT/Metrorail Alternative

The construction-related effects of this combined alternative on aquatic habitat could include short-term noise and vibration, air pollution, and temporary increases in runoff and erosion from construction equipment and activities. Construction effects would be minimized by compliance with local ordinances and use of BMPs. BMPs would be used during construction to control erosion, sediment, and stormwater and to prevent permanent negative effects on the aquatic community.

#### 4.3.5.5 Phased Implementation Alternative

Construction of this alternative would involve the implementation of BRT and Metrorail over an extended period of time. Although the construction effects would be the same as those described above for the other three alternatives, the timing would be different. The effects of constructing Metrorail through Tysons Corner would add to the effects of constructing BRT from the Orange Line to the end of the project area in Loudoun County. These effects would then be followed by the effects of constructing Metrorail from Tysons Corner to the end of the study area in Loudoun County.

### 4.3.6 MITIGATION

Erosion, sediment, and stormwater controls during construction would minimize any potential permanent effects on the hydrology or aquatic structures present in the streams and wetlands identified in the study area. Stormwater management regulations administered by VDCR require that there be no net increase in peak discharge above the predevelopment condition. BMPs would be implemented for the selected alternative to retain and renovate stormwater in conjunction with state and local requirements. These could include minimizing the clearing of vegetation, controlling erosion by promptly seeding to stabilize exposed areas, constructing stormwater basins, and installing silt fences. BMPs for the handling, use, and disposal of hazardous materials and other measures (e.g., oil-water separators) would be put into effect at the BRT Maintenance and Storage Facility and Metrorail S&I Yard to ensure that releases of hazardous materials would not occur.

### 4.3.7 SUMMARY OF EFFECTS

A summary of aquatic biota and habitat effects is presented in Table 4.3-1.

**Table 4.3-1: Summary of Aquatic Biota and Habitat Effects**

| Alternative | Effects by Study Area | | | | | Mitigation |
|---|---|---|---|---|---|---|
| | Orange Line Connection | Tysons Corner | Mid Corridor | Dulles Airport | Loudoun County | |
| Baseline | None | None | None | None | None | None |
| BRT | None | None | Minor (wetland displaced)<br>Minimal (stormwater runoff) | None | Moderate [piping concrete-lined tributary (Route 772 North Option only)]<br>Minimal (stormwater runoff) | BMPs, no net increase in peak discharge |
| Metrorail | None | None | Minimal (stormwater runoff) | Alteration of base flow in stream | Moderate [piping concrete-lined tributary (Route 772 North Option only); clearing and construction in floodplain (Yard 7 only); in-stream construction, destabilization of stream banks (Yard 20 only)] | BMPs, no net increase in peak discharge |
| BRT/Metrorail | None | None | Minor (wetland displaced)<br>Minimal (stormwater runoff) | None | Moderate [piping concrete-lined tributary (Route 772 North Option only)]<br>Minimal (stormwater runoff) | BMPs, no net increase in peak discharge |
| Phased Implementation | None | None | Minimal (stormwater runoff) | Alteration of base flow in stream | Moderate [piping concrete-lined tributary (Route 772 North Option only); clearing and construction in floodplain (Yard 7 only); in-stream construction, destabilization of stream banks (Yard 20 only)] | BMPs, no net increase in peak discharge |

## 4.4 TERRESTRIAL BIOTA AND HABITAT

This section discusses the terrestrial biota (regional flora and fauna) and habitat resources along the corridor, including agricultural land, old fields, landscaped areas, and forest. Terrestrial biota refers to animals and plants, which live on land. The effects upon these resources that could result from the project are described, as well as the proposed measures to mitigate the effects. Additional information regarding terrestrial biota and habitat is provided in the *Natural Resources Technical Report* (June 2002).

### 4.4.1 LEGAL AND REGULATORY CONTEXT

Terrestrial habitats outside of private or public (local, regional, state, or federal) preserves, management areas, parks, or other legally protected areas have no special regulations limiting their use. However, plant and wildlife species within these areas are afforded legal protections. VDGIF regulates non-endangered wildlife at the state level. Federal protection also occurs for non-endangered wildlife under the Migratory Bird Treaty Act of 1918, last amended in 1986. This Act provides protection for all native migratory game and non-game birds with exceptions for the control of species that cause damage to agricultural or other interests. It also empowers the federal government to regulate the hunting season for all game species.

Plant and animal species whose populations have declined to a point where extinction is imminent are afforded legal protection under federal and state laws. A detailed discussion of the rare, threatened, or endangered species in the study area is presented in Section 4.5.

According to FAA Advisory Circular No. 150/5200-33, all species of wildlife can pose a threat to aircraft safety. However, some species are more commonly involved in aircraft strikes, such as gulls, waterfowl, raptors, doves, vultures, blackbirds, starlings, wading birds, and deer. The habitats for these species are mainly wetland areas. The hazardous wildlife attractants issue is discussed in Section 4.2.

VDGIF has the legislative mandate to manage Virginia's white-tailed deer resources including maintaining their habitat, managing their damage to other resources and property, and providing opportunities for recreation and education. VDGIF's strategic plan states that Virginia's wildlife populations should be managed to maintain optimum populations to serve the needs of the Commonwealth.

### 4.4.2 METHODOLOGY

Terrestrial biota and habitat within the study area were assessed by reviewing color aerial photographs flown in the spring of 2000 and by conducting a field reconnaissance from December 2000 to February 2001. Terrestrial habitat was characterized within 300 to 2,000 feet from the centerline of the DAAR and the Dulles Greenway. The study area varied depending on the types of improvement proposed (e.g., stations, maintenance and storage facilities, and construction staging areas).

Forest cover types were classified broadly and are based on a review of aerial photography and general field observations of representative forests within the study area. To assess the potential presence of county and state champion trees (a champion tree is the largest tree of its species that occurs within a given jurisdiction such as a state or county) within the study area, consultations were conducted with urban foresters from the Urban Forestry Branch of Fairfax County's Department of Environmental Management and Loudoun County's

Arborist in the Department of Building and Development. Terrestrial wildlife species encountered during fieldwork for the project were documented using identification keys and field guides.

Potential impacts to these resources from the proposed project were assessed through an overlay analysis of project alternatives with the existing resources. For terrestrial habitat and its corresponding wildlife, a potential impact is defined as a conversion of the existing habitat or land use to another habitat or land use. It is presumed that the conversion would result in the death or displacement of the wildlife component of the habitat.

### 4.4.3 EXISTING CONDITIONS

Terrestrial habitat and its corresponding wildlife within the study area occur within a mosaic of developed and undeveloped landscapes. In general, landscapes within the Fairfax County portion of the project are developed or developing rapidly and only a few natural habitats remain, primarily along streambank corridors. Landscapes within the Loudoun County portion of the study area are less developed, but are also rapidly converting to commercial, institutional, and residential uses.

These terrestrial habitats vary in their ability to support wildlife. For habitats to be suitable for wildlife species they must provide food, shelter, nesting sites, and water. Within developed or rapidly developing areas, less-mobile wildlife populations are reduced to such low numbers that local extinctions are possible. More-mobile species must move into increasingly smaller habitat patches, creating extreme competition for limited resources. This leads to overall declines in wildlife populations and allows for the invasion of more disturbance-tolerant species. Terrestrial habitats found within the study area are described below and include agricultural land, old-field, landscaped areas, and forest.

Agricultural land within the study area includes grain (primarily corn) and hay fields and pastures. Hay fields are commonly comprised of orchard grass and Timothy grass that is harvested several times during the growing season to use for livestock forage. Pastureland is comprised of short, grazed grasses, such as fescue, with scattered low growing, and broad-leaved herbaceous plants. This type of habitat often provides food, but lacks suitable nesting sites. Crop fields are the least desirable for nesting, but can serve as important feeding sites for birds, raccoon, and white-tailed deer. These habitats also support small mammals and several species of snakes.

Old-field habitat occurs where agricultural land has been abandoned or forests have been disturbed and the land is in various stages of plant succession. Abandoned agricultural land within the study area is typically comprised of meadow grasses, broom-sedge briers, multiflora rose, and red cedar. This habitat type is generally desirable for many species of wildlife that prefer a mix of open grassland and scrub-shrub.

Landscaped habitats include residential, commercial, and institutional areas with manicured lawns and tree and shrub plantings. Landscaped areas generally provide the least amount of habitat for wildlife and are often comprised of small areas of non-native ornamental vegetation of limited use to wildlife species. Ornamental plants that produce food for wildlife often are invasive within nearby natural habitats, displacing more native plant varieties. Typical wildlife that occurs within these developed landscapes includes many non-native species such as European starling, house sparrow, house mouse, and black rat. In developed landscapes with small woodlots or strips of forested habitat, other species could occur that are more typical of suburban settings. These include such common yard birds as northern mockingbird, American robin, and northern cardinal. These settings also support small mammals, amphibians, and reptiles, including eastern chipmunk, gray squirrel, American toad, and black rat snake.

Forested habitat generally occurs as small buffer strips in developed and agricultural areas. Larger forest tracts are generally associated with stream valleys, wetland areas, or steep-sloped lands, which have been restricted from development by regulation or inaccessibility. Forest cover types that occur within the study area include upland and wetland deciduous, upland mixed deciduous/coniferous, upland coniferous, and riparian. Forested habitat generally provides a broad range of important resources for wildlife and consequently often supports a greater diversity of species than other habitat types. However, this diversity varies between forests depending upon the size, degree of disturbance, community structure, presence of streams or wetlands, and proximity to other habitats. Small forest strips within developed landscapes generally support the fewest wildlife species. These patches of forest are often disturbed and contain many low-quality exotic plant species. Wildlife using these areas are typically disturbance-tolerant species.

Large forest tracts support a greater diversity of both plant and animal species, which varies depending upon the amount of human-induced or wildlife-induced disturbance. Most forests within the study area contain a large population of white-tailed deer. These deer herds have been forced into smaller and smaller forest patches, resulting in overpopulation. Large numbers of deer in smaller areas results in over-browsing of food resources, which in turn changes the natural vegetation composition. In many areas, this has led to the elimination of low vegetation cover for many species of wildlife. Generally, these forest tracts still support a wide variety of wildlife species such as raccoon, opossum, gray squirrel, southern flying squirrel, eastern chipmunk, white-footed mouse, big brown bat, star-nosed mole, short-tailed shrew, striped skunk, box turtle, wood frog, spring peeper, spotted salamander, red-backed salamander, brown snake, tufted titmouse, Carolina chickadee, white-breasted nuthatch, blue jay, red-bellied woodpecker, downy woodpecker, eastern wood-pewee, ruby-throated hummingbird, and blue-gray gnatcatcher.

Forest tracts greater than 50 contiguous acres also provide habitat for a specialized group of birds. These species require large tracts of forest to sustain viable breeding populations. The group includes colorful songbirds that breed in the mid-Atlantic region and migrate to Central and South America, as well as year round residents and short-distance migrants. Over the past 30 to 40 years many of these species have shown consistent population declines because of habitat loss in their wintering grounds and forest fragmentation of their breeding grounds. In smaller woodlots, concealment from predators is difficult. These birds commonly encountered in Northern Virginia include red-shouldered hawk, hairy woodpecker, pileated woodpecker, Acadian flycatcher, wood thrush, red-eyed vireo, northern parula, black-and-white warbler, worm-eating warbler, ovenbird, Louisiana waterthrush, and scarlet tanager.

No trees from the Fairfax or Loudoun counties' champion tree lists are present within the study area.

#### 4.4.3.1 Orange Line Connection and Tysons Corner

These portions of the study area occur within the highly developed portion of Fairfax County. Land use along the Dulles Connector Road is primarily residential while the land uses near Tysons Corner are almost entirely commercial, retail, and institutional. Consequently, landscaped habitat, as defined above, is the dominant cover type that exists within these areas.

Old-field habitat also occurs in some underdeveloped parcels in Tysons Corner. Several species of birds that prefer this habitat have shown declines within Tysons Corner in recent years, including prairie warbler, field sparrow, and willow flycatcher. Other wildlife commonly found in old-field habitats include meadow vole, eastern cottontail, groundhog, eastern garter snake, and eastern hognose snake.

A riparian forest corridor exists along Pimmit Run. Upland mixed deciduous and coniferous forests are located within the interchanges of the Dulles Connector Road with I-495 and Route 123, and some undeveloped parcels within Tysons Corner.

#### 4.4.3.2 Mid-Corridor

This section of the study area occurs in a mostly developed or developing portion of Fairfax County. The eastern portion is comprised of residential development while the remainder is comprised of residential, commercial, and institutional development. Within these developments, the primary habitat type is landscaped. However, upland deciduous forests are found between houses on larger lots, along a narrow strip adjacent to the Dulles Toll Road, and on a few larger, undeveloped lots that occur on steep slopes or adjacent to small streams.

Riparian forest exists along the larger stream systems including Courthouse Spring Branch, Wolf Trap Run, Difficult Run, and Sugarland Run. These large riparian habitats are generally over 200 feet wide and are often contiguous with upland deciduous forest. Upland coniferous forest occurs in a small patch north of the DAAR and the Dulles Toll Road adjacent to the Filene Center at the Wolf Trap Farm Park. Upland mixed deciduous and coniferous forest occurs primarily west of Hunter Mill Road, between the DAAR and Dulles Toll Road and Sunset Hills Road, and south of the DAAR and Dulles Toll Road on either side of Monroe Street.

Forested habitats in the Mid-Corridor are similar to the forests in Tysons Corner and generally provide a broad range of important resources for wildlife, and consequently often support a greater diversity of species than other habitat types. As discussed above, biodiversity varies depending on forest size, degree of disturbance, community structure, presence of streams or wetlands, and proximity to other habitats.

#### 4.4.3.3 Dulles Airport and Loudoun County

These sections of the study area are the least developed. However, the Dulles Airport facility is also expanding with additional runways and parking lots. Along the Dulles Greenway west of Dulles Airport to the western study area limits, agricultural land use is rapidly being converted to institutional, commercial, and residential developments. Upland deciduous and coniferous forest occurs in large tracts along the Dulles Greenway between Route 606 and Route 772 interchanges. Riparian forests occur along Horsepen Run and Broad Run. These floodplain corridors are several hundred feet wide within the study area.

In the Dulles Airport and Loudoun County portions of the study area, the forest tracts are greater than 50 contiguous acres. These forests are larger and typically support a greater diversity of both plant and animal species than forests in Tysons Corner. The types of species in both areas are similar, but vary depending upon the amount of human- or wildlife-induced disturbance.

Small patches of old-field habitat and agricultural land also occur in this portion of the study area. Developed habitat occurs as managed short grass areas adjacent to Dulles Airport runways. Old-field habitat in the area is similar to the old-field habitat discussed for the Tysons Corner area, with species of wildlife that prefer a mix of open grassland and scrub-shrub. Some of the old-field habitat occurs within an area mapped as diabase soils. As discussed in Section 4.5, this area could potentially support rare plants that are potentially present in areas with diabase glade soils. Agricultural land that occurs in this portion of the study area provides only marginal habitat for wildlife. Hay fields and well-managed pastureland can be important habitat for declining populations of grassland nesting birds, including grasshopper sparrow and eastern meadowlark.

### 4.4.4 LONG-TERM EFFECTS

Because the proposed Build Alternatives would primarily be located within the medians of existing roadways and in areas developed or rapidly developing, the potential long-term impacts are minimal. For terrestrial habitat and its corresponding wildlife, a potential impact is defined as a conversion of the existing habitat or land use to another habitat or land use. It is presumed that the conversion would result in the death or displacement of the wildlife in the habitat.

#### 4.4.4.1 Baseline Alternative

Under the Baseline Alternative, there would be no effects to terrestrial biota and habitat from the Dulles Corridor Rapid Transit Project. However, there could be effects from the improvements assumed under this alternative. Identification of these effects is the responsibility of the agencies and jurisdictions implementing the improvements.

#### 4.4.4.2 BRT Alternative

Because most of the BRT stations, stops, and facilities would be located within developed areas and away from forested areas, and because the BRT vehicles would use existing roadways, minimal long-term effects to terrestrial resources are anticipated from implementing the BRT Alternative, which has three possible alignments (BRT 1, BRT 2, and BRT 3). The effects of these alignments on terrestrial biota and habitat are almost identical. Differences are noted below.

**Orange Line Connection**

No new BRT stops or stations would be located within this portion of the study area and BRT vehicles would travel on the existing lanes of the Dulles Connector Road. However, a small area of forest would be removed within the interchange area for I-66 and the Dulles Connector Road for a bus layover facility. Also, small amounts of old field and landscaped areas would be removed at the West Falls Church Metrorail Station when a bus bay area is modified for the BRT vehicles. The habitats being removed are located within busy urban areas, surrounded by transportation facilities, and are very small in size. These areas are of limited importance for terrestrial wildlife, serving mostly as temporary foraging areas for birds.

**Tysons Corner**

Forest resources in this area are located north of the DAAR and Dulles Toll Road, away from the proposed BRT station and its facilities at Spring Hill Road. Under Alignments BRT 2 and BRT 3, the stop at Tysons-West*Park Transit Station would be located at the existing transit center. Therefore, no effects to terrestrial biota or habitat are anticipated.

**Mid-Corridor**

Small amounts of landscaped, old-field, and forested habitat would be removed during the proposed construction of the Wiehle Avenue, Reston Parkway, and Herndon-Monroe stations. Due to their small size and their locations along the Dulles Toll Road, within existing and developing office parks, and in the median of the DAAR, these areas offer minimal habitat to support wildlife species. Therefore, effects to terrestrial biota or habitat are anticipated to be minimal.

The new park-and-ride facility at the Herndon-Monroe Station would include two proposed parking structures located immediately east and west of the existing structure. The proposed parking facility to the west would affect a minor amount of forested habitat. The effects to the wetland are discussed in Section 4.2. Wildlife impacts could involve displacement of some individual animals, however, local species extinctions are not

anticipated, as sufficient habitat would remain.

Under BRT 1, at the Route 28 Station, landscaped and forested habitat would be displaced for the station facilities to the north and south of the DAAR, respectively. The effects to plants and animals due to the displacement of the landscaped area would be minimal. The area to the north of the DAAR is currently maintained for soccer fields. The station facilities to the south of the DAAR would be located in what is currently a large amount of deciduous forest. Displacement of the forest in this area would create a large opening in the forest habitat providing opportunities for nest predators such as brown-headed cowbirds.

**Dulles Airport**

The BRT stop at Dulles Airport would be located on the curb in front of the main terminal, and BRT vehicles would travel on existing airport roadways. No impacts to terrestrial biota or habitat are anticipated.

**Loudoun County**

The Route 606 Stop is proposed within the Dulles North Transit Center currently operated by VDOT. When demand warrants, a new parking facility would be constructed on the parcel to the immediate west of the Dulles North Transit Center. This parcel is partially wooded and would be cleared during construction. No effects on terrestrial biota or habitat are anticipated.

Two potential options for stops at Route 772 are being evaluated in this Draft EIS. The northern option would result in the removal of a moderate amount of old-field habitat. It is not anticipated that this would negatively affect terrestrial wildlife, as this habitat type is present in adjacent parcels and provides minimal habitat.

The southern option would affect approximately eight acres of upland forest and a small area of agricultural land. Removal of this forest would further reduce the available natural areas in this rapidly developing landscape. Although, placement of the stop at the edge of the forest would minimize the impact, it is important to note that according to the *Loudoun County Revised General Plan* and the *Toll Road Plan*, the land use in this area is intended to support high-density development as a transit node.

The BRT Maintenance and Storage Facility would involve the clearing and grading of forested land at the interchange between Route 606 and the Dulles Greenway. Minimal impacts to terrestrial species are anticipated by this removal.

#### 4.4.4.3 Metrorail Alternative

The effects of the Metrorail Alternative on terrestrial biota and habitat, from WMATA's existing Orange Line to the Loudoun County portions of the study area, are detailed below.

**Orange Line Connection**

Small areas and strips of forested habitat would be removed within the existing Metrorail S&I Yard located near the West Falls Church Station, along a narrow swath extending from the yard onto the median of the Dulles Connector Road, and in the vicinity of two traction power substations and two tie-breaker stations. In addition, the landscaped area in the median of the Dulles Connector Road also would be removed. These small areas of habitat are located within busy urban areas, surrounded by transportation facilities. Accordingly, they are of limited importance for terrestrial wildlife, serving mostly as temporary foraging areas for birds. Minimal impacts to terrestrial biota and habitat are anticipated.

**Tysons Corner**

Minimal effects to terrestrial biota and habitat are anticipated as a result of implementing Metrorail service in

Tysons Corner.

**Alignment T1.** Small areas of old-field and narrow strips of forested habitat would be removed for the Tysons East and Tysons Central stations. At the Tysons East Station, old-field habitats and forested habitats border the Scotts Run Stream Valley Park. Wildlife impacts would involve displacement of some species; however, local extinctions are not anticipated as sufficient habitat would remain. In addition, minor amounts of landscaped habitat would be removed as a result of the Tysons West Station. Most of the required traction power substations, tie-breaker stations, and stormwater ponds would be located within the stations discussed above or in parking lots.

**Alignments T6 and T9.** Small areas of old-field and narrow strips of forested habitat would be removed for the Tysons East and Tysons Central D stations. At the Tysons East Station, old-field and forested habitats border the Scotts Run Stream Valley Park. For Alignment T9 and T9 Design Option, wildlife impacts would involve displacement of some species, however, local extinctions are not anticipated, as sufficient habitat would remain. In addition, minor amounts of landscaped habitat would be removed to accommodate the Tysons Central C and Tysons West stations.

**Alignment T4**. Small areas of old-field and narrow strips of forested habitat would be removed for the Tysons East, Tysons Central D, and Tysons Central B stations. In addition, minor amounts of landscaped habitat would be removed to accommodate the Tysons Central C and Tysons West stations.

At the Tysons East Station, the old-field and forested habitats border the Scotts Run Stream Valley Park. At the Tysons Central B Station, the affected area of forested habitat is part of a larger forested parcel. Wildlife impacts could involve displacement of some individual animals; however, local species extinctions are not anticipated as sufficient habitat would remain.

### Mid-Corridor

The Metrorail alignment through this section would follow the median of the DAAR and most of the proposed stations would be located in developed areas. Small amounts of landscaped, old-field, and forested habitat would be removed along the median and for the station facilities at Wiehle Avenue, Reston Parkway, and Herndon-Monroe. In addition, small amounts of forested habitat would be eliminated for traction power substations, tie-breaker stations, and stormwater management ponds. Minimal effects to terrestrial biota and wildlife are anticipated as a result.

The new park-and-ride facility at the Herndon-Monroe Station would include two proposed parking structures located immediately east and west of the existing structure. The proposed parking facility to the west would affect a minor amount of forested habitat. The effects to the wetland are discussed in Section 4.2. Wildlife impacts could involve displacement of some individual animals, however, local species extinctions are not anticipated, as sufficient habitat would remain.

At the Route 28 Station, landscaped and forested habitat would be displaced for the station facilities to the north and south of the DAAR, respectively. The effects to plants and animals due to the displacement of the landscaped area would be minimal. The area to the north of the DAAR is currently maintained for soccer fields. The station facilities to the south of the DAAR would be located in what is currently a large amount of deciduous forest. Displacement of the forest in this area would create a large opening in the forest habitat providing opportunities for nest predators such as brown-headed cowbirds.

**Dulles Airport**

Within Dulles Airport, the Metrorail alignment would primarily run along landscaped and paved areas in its aboveground segments. The one exception is where the northern connection heads north from the airport to the Dulles Greenway. In this area, the alignment extends through a deciduous forest for a short distance before crossing Horsepen Run and entering the median of the Greenway. While the amount of forest clearing is not extensive, it would create a new opening within a contiguous forest patch of about 100 acres. As described above, contiguous forests greater than 50 acres serve as a valuable habitat for various birds. Other wildlife species could be displaced from the area adjacent to the new rail line, but sufficient habitat would remain to ensure survival of all the species.

**Loudoun County**

The proposed Metrorail alignment in Loudoun County would follow the median of the Dulles Greenway. Two stations are planned within old-field and forested habitats adjacent to the Greenway. The effects of these stations under the Metrorail Alternative are the same as those discussed above for the BRT Alternative.

The addition of traction power substations, tie-breaker stations and stormwater management ponds in this portion of the study area would also result in the removal of small amounts of old-field and forested habitats. The resulting effects to terrestrial biota and habitat are anticipated to be minimal.

**Metrorail S&I Yard Sites**

Site 7 is located on a forested parcel (primarily pine and cedar forest with some deciduous trees at the extreme eastern end). Small areas of agricultural land and old-field habitats would also be affected. The loss of substantial areas of forest would displace a number of individuals of various wildlife species. However, long-term effects to these species are not anticipated. Coniferous (cone bearing) forest areas are generally less diverse than comparable areas of deciduous forest, and large areas of coniferous habitat would remain to the north and south of the proposed yard site.

Site 15 would result in approximately 20 acres of mostly deciduous forest being removed. Construction of an S&I Yard on Site 15 would affect this habitat, but only represent an encroachment impact. The proposed yard lead for Site 15 would create an opening in the large forest stand, reducing the overall quality of the stand. As discussed in Section 4.5, Site 15 could support rare diabase glade vegetation.

Site 20 would affect an area within a large contiguous stand of forest along Broad Run. This effect would fragment the forest habitat and result in possible displacement of a number of individuals of various species of wildlife. The yard lead for Site 20 would also affect forested habitat along a portion of Broad Run and a small amount of old-field and other forested habitat before tying into the mainline, east of the Loudoun County Parkway.

### 4.4.4.4 BRT/Metrorail Alternative

The effects of the BRT/Metrorail Alternative from the Orange Line to Tysons West Station would be identical to the Metrorail Alternative in that geographic area. The effects of the BRT/Metrorail Alternative from the Tysons West Station to Route 772 in Loudoun County would be identical to those identified above for the BRT Alternative in that geographic area.

### 4.4.4.5 Phased Implementation Alternative

The effects of the Phased Implementation Alternative would be generally the same as those identified for the Metrorail Alternative. Minor additional amounts of terrestrial habitat would be cleared for construction of

BRT-only facilities; however, the effects to terrestrial biota would be minimal. No additional effects over those identified above would result from first implementing BRT or from the removal of BRT facilities.

### 4.4.5 CONSTRUCTION EFFECTS

Under the Baseline Alternative, there would be no construction-related effects to terrestrial biota and habitat from the Dulles Corridor Rapid Transit Project. However, there could be construction-related effects from the improvements assumed under this alternative. Identification of those effects is the responsibility of the agencies and jurisdictions implementing the improvements. Minimal short-term effects to terrestrial biota and habitat are anticipated as a result of constructing the Build Alternatives, and could include short-term noise and vibration and air pollution from the construction equipment and activities.

### 4.4.6 MITIGATION

Within Dulles Airport, the alignment extends through a deciduous forest for a short distance before crossing Horsepen Run and entering the median of the Greenway. This would create a new opening within a contiguous forest patch of about 100 acres. One available method of minimizing potential impacts to this forest would be to clear the minimum width necessary for the alignment. Within the Commonwealth, mitigation measures are not required for impacts to upland habitats including forests. No mitigation measures are proposed at this time. To minimize construction effects, BMPs would be used, and local ordinances would be followed.

### 4.4.7 SUMMARY OF EFFECTS

A summary of terrestrial biota and habitat effects is presented in Table 4.4-1.

**Table 4.4-1: Summary of Terrestrial Biota and Habitat Effects**

| Alternative | Effects by Study Area Section | | | | | Mitigation |
|---|---|---|---|---|---|---|
| | Orange Line Connection | Tysons Corner | Mid Corridor | Dulles Airport | Loudoun County | |
| Baseline | None | None | None | None | None | None |
| BRT | Minimal (clearing, grading habitat) | None | Minimal/Moderate [clearing and grading habitat (BRT 1)] | None | Minimal/Moderate (clearing, grading habitat) | BMPs, local ordinances |
| Metrorail | Minimal (clearing, grading habitat) | Minimal (clearing, grading habitat) | Minimal (clearing, grading habitat) | Minimal | Minimal/Moderate (clearing, grading habitat) | BMPs, local ordinances |
| BRT/Metrorail | Minimal (clearing, grading habitat) | Minimal (clearing, grading habitat) | Minimal/Moderate [clearing and grading habitat (BRT 1)] | None | Minimal/Moderate clearing, grading habitat) | BMPs, local ordinances |
| Phased Implementation | Minimal (clearing, grading habitat) | Minimal (clearing, grading habitat) | Minimal/Moderate [clearing and grading habitat] | Minimal | Minimal/Moderate (clearing, grading habitat) | BMPs, local ordinances |

## 4.5 RARE, THREATENED, AND ENDANGERED SPECIES

This section discusses the rare, threatened, and endangered species within the Dulles Corridor. The effects upon these resources that could result from the proposed project, as well as mitigation measures, are discussed below. Additional information regarding rare, threatened, and endangered (RTE) species is provided in the *Natural Resources Technical Report* (June 2002).

### 4.5.1 LEGAL AND REGULATORY CONTEXT

Plant and animal species whose populations have declined to a point where extinction is imminent are afforded legal protection under federal and state laws. Federally listed threatened and endangered species and designated critical habitat are regulated pursuant to Section 7 of the Endangered Species Act of 1973. A listing of these species and their federal status is published in the *Federal Register*. USFWS and the National Marine Fisheries Service (NMFS) are authorized to identify those species in danger of extinction and provide for their management and protection. USFWS also maintains a list of candidate species that do not have threatened or endangered status, but are of special concern. All of these listed species are commonly referred to as RTE.

The Commonwealth has enacted laws and has adopted regulations to protect state-designated endangered and threatened species, in addition to protecting federally listed species. Under the Commonwealth's Endangered Plant and Insect Species Act of 1979, threatened or endangered plants and insects are protected. The Act provides for the listing and protection of species through VDACS with help from the Division of Natural Heritage (DNH) of VDCR. Under the Commonwealth's Endangered Species Act of 1972 (as amended in 1977), VDGIF adopted regulations protecting mollusks, fishes, amphibians, reptiles, birds, and mammals classified as endangered or threatened.

### 4.5.2 METHODOLOGY

The potential presence of RTE species within the Dulles Corridor was determined through contact with the USFWS, VDCR, VDACS, and VDGIF. The initial study area for RTE species consisted of Fairfax and Loudoun Counties. The area was then narrowed based on the species and habitat likely to be present near the proposed improvements. Study areas for RTE species are specific to each RTE species.

Agency responses to the project team's requests for information were used to identify areas within the Dulles Corridor where RTE issues could need to be investigated during future phases of the project. Correspondence from reviewing agencies is contained in Appendix F. Species encountered during project fieldwork were documented using identification keys and field guides.

Potential impacts to these resources from the proposed project were assessed through an overlay analysis of alternatives with the existing resources. For RTE species, a potential effect is defined as a taking (harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing or collecting, or attempting to engage in any such conduct) of the listed species or its critical habitat.

### 4.5.3 EXISTING CONDITIONS

USFWS provided the project team with a list of species with federal status and species of concern that have been documented or could occur within Fairfax and Loudoun counties. Species of concern are not federally regulated, but represent species whose populations are being watched carefully because of recent declines or uncertain status. Within Fairfax County, the bald eagle (*Haliaeetus leucocephalus*) was the only federally listed animal species reported. It is known to nest in areas along the Potomac River, outside the study area.

Two federally listed plant species were also noted by USFWS: the sensitive joint-vetch (*Aechynomene virginica*) and small whorled pogonia (*Isotria medeoloides*). The joint-vetch is known to occur in Prince William County and could also occur in Fairfax County. Specific distribution information for the small whorled pogonia was not available. No surveys for these listed species were recommended by USFWS. In Loudoun County, no

documented occurrences of federally listed species were reported near the study area. In addition, neither of these species was observed during field reconnaissance.

Correspondence from VDCR and VDGIF addressed both federal- and-state-listed species within the study area. Both agencies indicated that federally listed rare, threatened, or endangered species are not known to occur within the study area. However, VDGIF indicated the potential presence of two state-threatened species near the Dulles Corridor—the upland sandpiper (*Bartramia longicauda*) and wood turtle (*Clemmys insculpta*). The upland sandpiper prefers tall-grass fields in large open landscaped areas where it builds its ground nest from dried grasses. Wood turtles inhabit forested floodplains and nearby fields, wet meadows, and farmlands. The turtles are known to winter on the bottoms of creeks and streams. Sightings of wood turtle have been documented within Difficult Run in Fairfax County and Sugarland Run in Loudoun County. The documented sighting of the wood turtle in Sugarland Run was well outside the study area.

In VDCR correspondence (contained in Appendix F), the agency identified the presence of a unique natural community within the project corridor known as the diabase glade habitat. Diabase glades are characterized by historically fire-dominated grassland vegetation located on relatively nutrient-rich soils underlain by Triassic bedrock. Diabase flat rock, a hard dark-colored, volcanic rock, is found primarily in counties in Northern Virginia, and is located within the geologic formation known as the Triassic Basin. Where the bedrock is exposed, a distinctive community of drought-tolerant plants occurs. Diabase flat rocks are extremely rare natural communities that are threatened by development. In Northern Virginia, several state and globally rare plant species associated with diabase glade communities may occur within the proposed S&I Yard sites. The VDCR indicated that the potential presence of seven rare plant species, including earleaf foxglove (*Agalinis auriculata)*, white heath aster *(Aster ericoides)*, blue-hearts *(Buchnera Americana)*, hairy beardtongue *(Penstemon hirsutus)*, downy phlox *(Phlox pilosa)*, stiff goldenrod *(Oligoneuron rigidum* var. *rigidum)*, and marsh hedgenettle *(Stachys pilosa* var. *arenicola)*. State and federal agencies do not regulate these species, but their populations are monitored because of their uncommon occurrence in Virginia.

A letter from VDCR during the Major Investment Study (MIS) (January 1995) identified an occurrence of the hairy beardtongue *(Penstemon hirsutus)* near the southwest corner of the DAAR exit ramp to Route 28. This occurrence was not mentioned in any of the recent VDCR correspondence or agency comments. Figure 4.5-1 shows bands of diabase soils crossing the Dulles Toll Road and the Dulles Greenway in western Fairfax County and eastern Loudoun County, respectively. In Fairfax County, a band of diabase soils cross the project corridor near the Dulles Toll Road, the Fairfax County Parkway, and Centerville Road. In Loudoun County, diabase soils occur within a band through the Route 606/Dulles Greenway, and south along Route 606.

Figure 4.5-1 shows bands of diabase soils crossing the Dulles Toll Road and the Dulles Greenway in western Fairfax County and eastern Loudoun County, respectively. A field investigation was conducted on April 18, 2002, at Dulles Airport to review the presence of state and globally rare plant species associated with diabase glade communities located at Yard 15. Within these areas, the VDCR Division of Natural Heritage has indicated that the most likely places to find rare diabase plants are rocky glades or in warm-season grass-dominated old-field and roadside rights-of-way. A review of aerial photography prior to the filed investigation revealed an old-field habitat along the south side of Route 606 within the proposed yard site. During the filed visit, old-field conditions were verified, however, warm-season grass habitat was lacking. The dominant vegetation consists of young red cedar (*Juniperus virginiana),* goldenrod (*Solidago sp*.), Indian grass (*Sorghastrum nutans*), dogbane (*Apocynum* sp.), broom-sedge (*Andropogon virginicus*), greenbrier (*Smilax rotundifolia*), bluets (*Oldenlandia* sp.), panic grass (*Panicum* sp.), yarrow (*Achillea millefolium*), sumac (*Rhus* sp.), Eastern redbud (*Cercis*

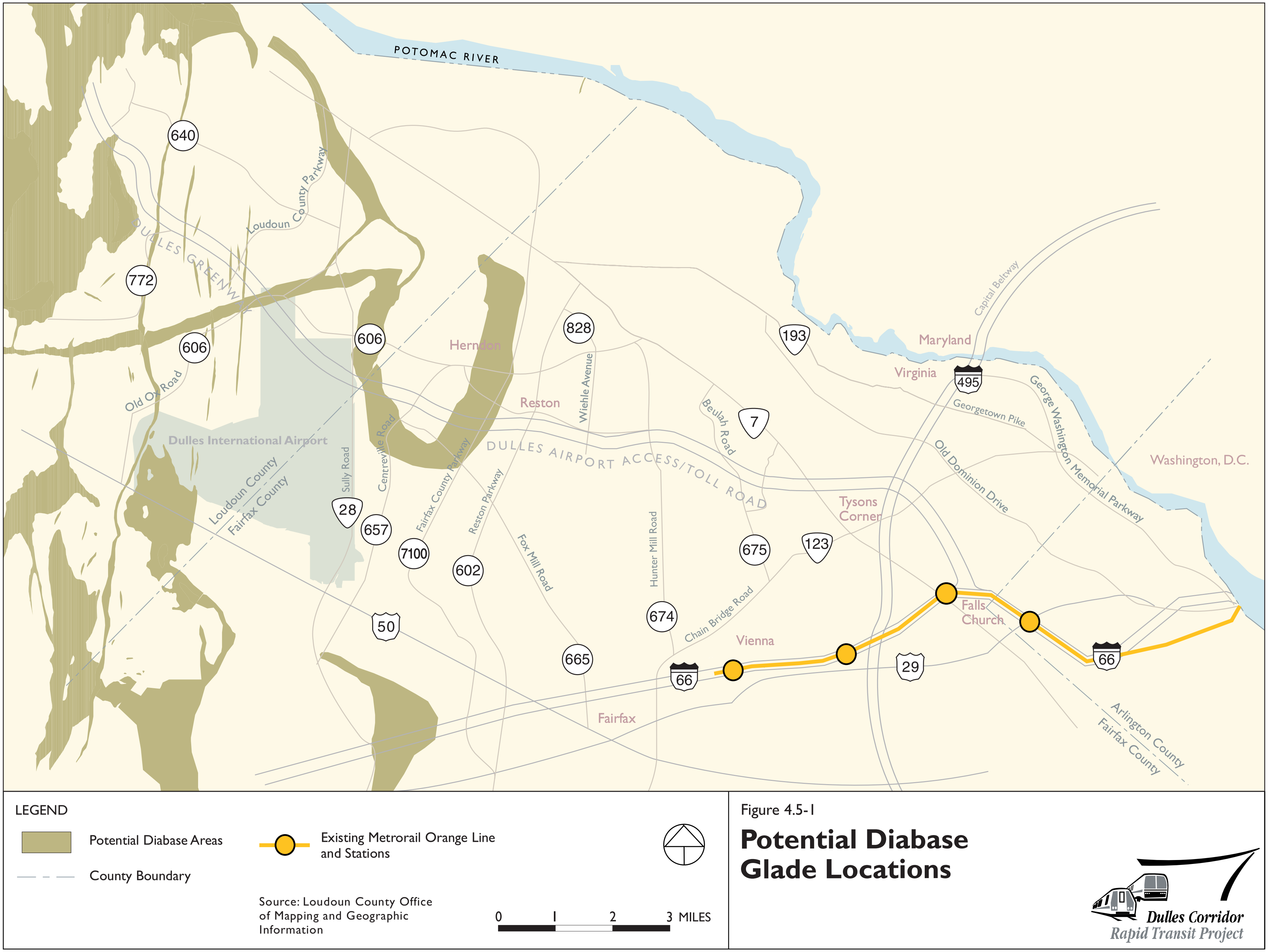



Figure 4.5-1

# Potential Diabase Glade Locations

*canadensis*), privet (*Ligustrum* sp.), and poison ivy (*Toxicodendron radicans*). Small patches of warm season habitat were unevenly distributed throughout the site but no indication of state rare plant species were observed. However, downy phlox is the only stated-listed species that would have been flowering during the investigation. The other listed species flower in the mid to late summer making these plants undistinguishable during the field visit. Regardless, the limited diversity of warm-season grasses in combination with the growth of red cedar indicates an absence of suitable habitat for rare diabase plants.

### 4.5.4 LONG-TERM EFFECTS

The long-term effects of implementing either the Baseline Alternative or the Build Alternatives are discussed below.

#### 4.5.4.1 Baseline Alternative

Under the Baseline Alternative there would be no effects to RTE species and habitat from the Dulles Corridor Rapid Transit Project. However, there could be effects from the improvements assumed under this alternative. Identification of these effects is the responsibility of the agencies and jurisdictions implementing the improvements.

#### 4.5.4.2 BRT Alternative

The effects of the BRT Alternative discussed below would be the same for all three BRT alignments (BRT 1, BRT 2, and BRT 3). No long-term effects to RTE species are anticipated as a result of implementing the BRT Alternative, because BRT vehicles would travel on existing roadways, and most proposed stations and stops would be constructed within developed areas. The station at Route 28, the stop at Route 772, and the maintenance and storage facility near the Loudoun County Parkway and Dulles Greenway interchange would be located in rural areas.

Habitat suitable for the upland sandpiper, a state-threatened species, includes tall-grass fields in large open landscape areas. Such areas are not present near the Route 28 Station, the Route 772 Stop, or the Maintenance and Storage Facility. Suitable habitat for the wood turtle, another state-threatened species, could exist at the BRT Maintenance and Storage Facility, which would be located in the floodplain of Indian Creek. However, no sightings of the wood turtle within Indian Creek or its associated floodplain are documented.

#### 4.5.4.3 Metrorail Alternative

West of Tysons Corner, the Metrorail alignment would be located within the median of the DAAR, on airport property, and in the median of the Dulles Greenway. Proposed stations would be constructed within developed areas, except for the stations at Route 28, Route 606 and Route 772, and the S&I Yard near the Loudoun County Parkway and Dulles Greenway interchange.

The upland sandpiper is a state-threatened species. The sandpiper's habitat of tall-grass fields in large open landscaped areas is not present near the proposed sites of Route 28, Route 606 and Route 772 Stations, or at the S&I Yard. Suitable habitat for the wood turtle, another state threatened-species, could exist at the S&I Yard, which would be partially located in the floodplain of Broad Run. However, no sightings of the wood turtle within Broad Run or its associated floodplain are documented.

Documented sightings of the wood turtle have occurred within Difficult Run, a stream that would be crossed by the Metrorail alignment within the Mid-Corridor. New bridges would be constructed for the Metrorail

tracks that would span Difficult Run, with piers placed to match the existing bridges for the eastbound and westbound lanes of the DAAR and Dulles Toll Road. The BMPs listed in the *Virginia Erosion and Sediment Control Handbook* for engineering, stormwater management, and sediment and erosion control are standard measures that would be used during the construction of the Metrorail spans and alignment along the median of the DAAR to avoid water quality impacts to Difficult Run. In addition, the stormwater management facilities planned along the DAAR and at the Tysons West Station should help control non-point source pollution within the Difficult Run watershed. This would minimize potential negative long-term effects on the wood turtle.

East of Tysons Corner small areas of forested habitat within the existing S&I Yard located near the West Falls Church Station and the landscaped area in the median of the Dulles Connector Road would be removed. These small areas are located within busy urban areas, surrounded by transportation facilities. Accordingly, they would be of no importance to RTE species. Therefore, no impacts to RTE species are anticipated east of Tysons Corner.

#### 4.5.4.4 BRT/Metrorail Alternative

The impacts related to the Metrorail portion of the BRT/Metrorail Alternative (between the Orange Line and the western edge of Tysons Corner) are the same as those identified above for the Metrorail Alternative. The impacts related to the BRT portion of the BRT/Metrorail Alternative (west of Tysons Corner) would be the same as those identified above for the BRT Alternative.

#### 4.5.4.5 Phased Implementation Alternative

The effects of the Phased Implementation Alternative would be the same as those identified for the Metrorail Alternative. No additional effects would result from first implementing BRT or from removal of BRT facilities.

### 4.5.5 CONSTRUCTION EFFECTS

The short-term effects of implementing the Baseline Alternative and the Build Alternatives are discussed below.

#### 4.5.5.1 Baseline Alternative

Under the Baseline Alternative, there would be no construction-related effects to RTE species and habitat from the Dulles Corridor Rapid Transit Project. However, there could be construction-related effects from the improvements assumed under this alternative. Identification of those effects is the responsibility of the agencies and jurisdictions implementing the improvements.

#### 4.5.5.2 BRT Alternative

Construction of the BRT Alternative would not result in any action that would affect RTE species or their critical habitats.

#### 4.5.5.3 Metrorail Alternative

Construction of the Metrorail Alternative would not result in any long-term effect to regulated RTE species or their critical habitat. BMPs for engineering, storm water management, and sediment and erosion control would be used during the construction of the Metrorail spans and alignment along the median of the DAAR to avoid water quality impacts to Difficult Run. This would minimize potential negative construction-related effects on the wood turtle.

#### 4.5.5.4 BRT/Metrorail Alternative

Construction of the BRT/Metrorail Alternative would not result in any action that would affect RTE species or their critical habitats.

#### 4.5.5.5 Phased Implementation Alternative

Construction of this alternative would involve the implementation of BRT and Metrorail over an extended period of time. Although the construction effects would be the same as those described above for the other three alternatives, the timing would be different. The effects of constructing Metrorail through Tysons Corner would add to the effects of constructing BRT between the Orange Line and Loudoun County. These effects would then be followed by the effects of constructing Metrorail between Tysons Corner and the end of the study area in Loudoun County.

### 4.5.6 MITIGATION

Since there are no major effects to RTE species, no mitigation is required.

### 4.5.7 SUMMARY OF EFFECTS

A summary of the rare, threatened, and endangered species effects is presented in Table 4.5-1.

**Table 4.5-1: Summary of Rare, Threatened, and Endangered Species Effects**

| Alternative | Effects | Mitigation |
|---|---|---|
| Baseline | None | None |
| BRT | None | None |
| Metrorail | Minimal impacts to habitat | BMPs |
| BRT/Metrorail | None | None |
| Phased Implementation | Minimal impacts to habitat | BMPs |

## 4.6 AIR QUALITY

This section describes the air quality impact analysis conducted for the Dulles Corridor Rapid Transit Project. The potential air quality impacts would occur as a result of emissions from motor vehicle traffic associated with the project. Motor vehicle emissions vary with traffic volumes, distances traveled, travel speeds, and vehicle types. Additional information regarding the analysis of air quality is provided in the *Air Quality Technical Report* (June 2002).

### 4.6.1 LEGAL AND REGULATORY CONTEXT

The applicable statutes and regulations that govern air quality in the Dulles Corridor at both the federal and state levels are described below. The procedures that were used to demonstrate compliance with these regulations and related criteria are also included.

#### 4.6.1.1 Statutes and Regulations Affecting Air Quality

The Clean Air Act of 1970, as amended, is the basis for most federal air pollution control programs. The EPA under the Clean Air Act, as amended, regulates air quality nationally. EPA delegates authority to VDEQ for

monitoring and enforcing air quality regulations in the Commonwealth of Virginia. The *Virginia State Implementation Plan* (SIP), developed under the Clean Air Act, contains the major Commonwealth-level requirements with respect to transportation in general. VDEQ is responsible for preparing the SIP and submitting it to EPA for approval. VDEQ also works with local and regional agencies that have air quality responsibilities.

The Dulles Corridor is within the geographic jurisdiction of the Metropolitan Washington Council of Governments (MWCOG), which has air quality responsibilities related to transportation and air quality planning in the Washington, D.C. metropolitan region. Because Northern Virginia, which is included in the region, has been designated a non-attainment area for ozone, transportation plans and projects in the region must conform to the SIP. MWCOG develops the region's transportation and air quality strategies as well as specific programs to reduce emissions.

#### 4.6.1.2 Ambient Air Quality Standards

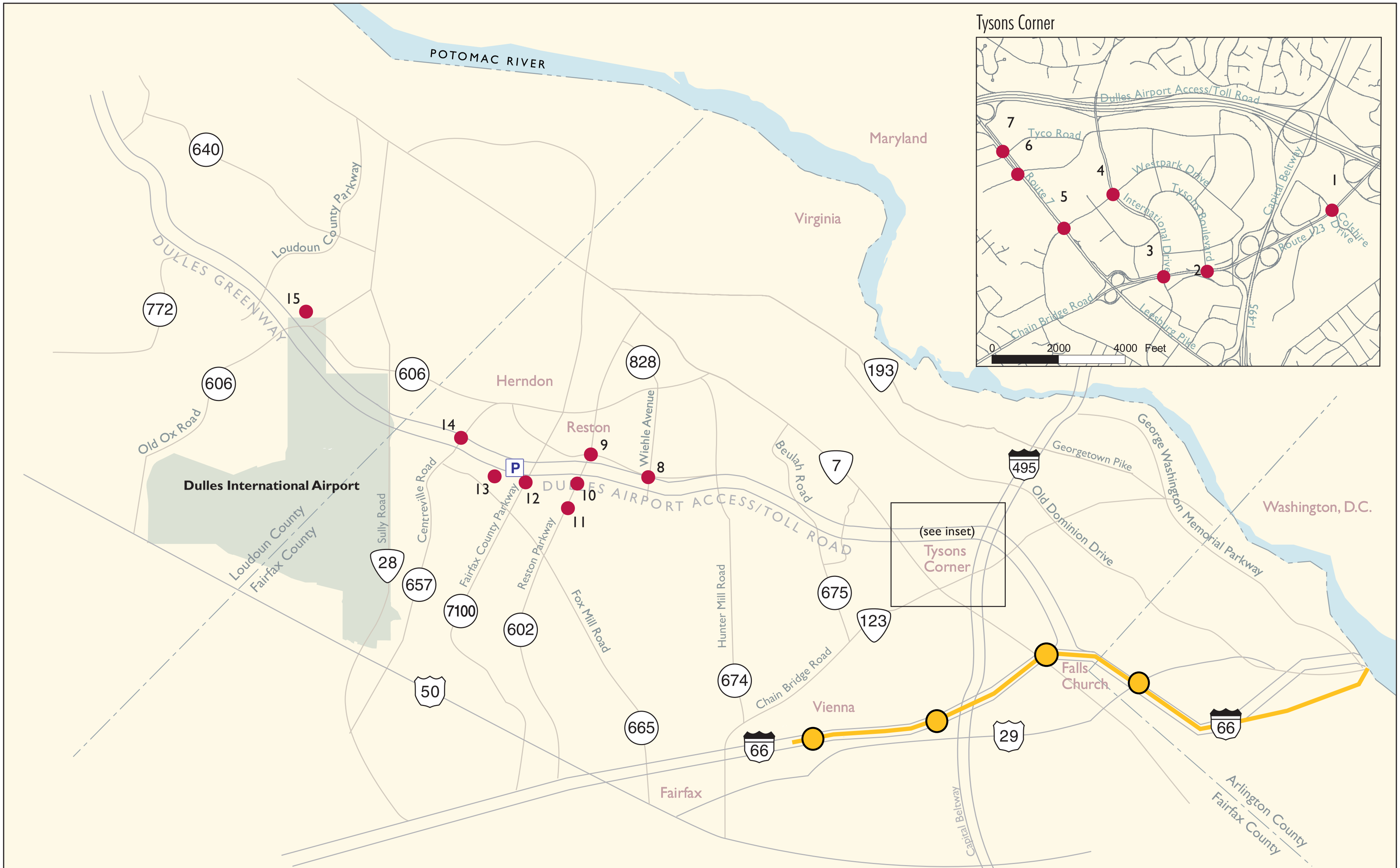
Under the authority of the Clean Air Act, EPA established a set of National Ambient Air Quality Standards (NAAQS) for various "criteria" air pollutants. These standards are intended to protect the public health and welfare. Primary NAAQS are established at levels intended to protect public health, including sensitive population groups, with an adequate margin of safety. Secondary NAAQS are set at levels designed to protect the public by accounting for the effects of air pollution on vegetation, soil, materials, and other aspects of the general welfare. States can develop ambient air quality standards provided that they are at least as stringent as the federal standards. Table 4.6-1 presents the NAAQS and the Virginia Ambient Air Quality Standards, which are identical.

Presently, there are NAAQS for six criteria pollutants: ozone, carbon monoxide (CO), nitrogen dioxide ($NO_2$), sulfur dioxide ($SO_2$), particulate matter of 10 microns or less ($PM_{10}$), and lead (Pb). The Washington metropolitan region is in non-attainment for ozone. Ozone is a strong oxidizing agent and a pulmonary irritant that affects the respiratory mucous membranes, other lung tissues, and respiratory functions. Volatile Organic Compounds (VOCs) are a general class of hydrocarbons (compounds containing hydrogen and carbon) and are a precursor to the formation of the pollutant ozone. Emissions of VOC are regulated by emission limits, while Federal and state ambient air quality standards govern ozone concentrations.

#### 4.6.1.3 Attainment Status and State Implementation Plan Requirements

The Clean Air Act also specifies geographic areas of the country that have measured pollutant concentrations exceeding the levels prescribed by the air quality standards (non-attainment areas). It classifies non-attainment areas and specifies compliance deadlines for these areas. The Dulles Corridor is located in Fairfax and Loudoun counties, which are located in the Metropolitan Washington, D.C.-MD-VA serious non-attainment area for ozone. The ozone non-attainment area must demonstrate attainment with the ozone standards by 2005. Metropolitan Washington is also a non-attainment area for CO. EPA provided the region an extension of time to 2005, due to the effects of ozone transport.

In compliance with the mandates of the Clean Air Act, VDEQ has developed a SIP for air pollution control. The SIP defines the process by which the ozone NAAQS would be attained, and defines the control strategies and schedule that the Commonwealth would employ to reduce emissions in order to reach attainment.




LEGEND

- Intersections Modeled for Air Quality Analysis
- P Herndon-Monroe Park & Ride Facility
- County Boundary
- Existing Metrorail Orange Line and Stations

0 1 2 3 MILES

Figure 4.6-1

# Roadway Intersections Modeled for Air Quality Analysis

Dulles Corridor Rapid Transit Project

**Table 4.6-1: National and Virginia Ambient Air Quality Standards**

| Pollutant | Standard Type | Averaging Period | Standard Value[a] |
|---|---|---|---|
| Carbon Monoxide (CO)[i] | Primary and Secondary[b]<br>Primary and Secondary[b] | 8-Hour average<br>1-Hour average | 9 ppm (10 mg/m$^3$)[c,d]<br>35 ppm (40 mg/m$^3$) |
| Nitrogen Dioxide ($NO_2$)[i] | Primary and Secondary | Annual arithmetic mean | 0.053 ppm (100 µg/m$^3$)[e] |
| Ozone ($O^3$)[i] | Primary and Secondary | 1-Hour average | 0.12 ppm (235 µg/m$^3$)[f] |
| Respirable Particulates ($PM_{10}$)[i] | Primary and Secondary<br>Primary and Secondary | Annual arithmetic mean<br>24-Hour average | 50 µg/m$^3$ [g]<br>150 µg/m$^3$ [g] |
| Lead (Pb) | Primary and Secondary | Quarterly mean | 1.5 µg/m$^3$ |
| Sulfur Dioxide ($SO_2$) | Primary<br>Primary<br>Secondary | Annual arithmetic mean<br>24-Hour average[h]<br>3-Hour average | 0.03 ppm (80 µg/m$^3$)<br>0.14 ppm (365 µg/m$^3$)<br>0.5 ppm (1300 µg/m$^3$) |

a Short-term standards (1 to 24 hours) are not to be exceeded more than once per calendar year.
b Former national secondary standards for carbon monoxide have been repealed.
c ppm: parts per million.
d mg/m$^3$: milligrams per cubic meter.
e µg/m$^3$: micrograms per cubic meter.
f Maximum daily 1-hour average. The ozone standard is attained when the expected number of days with maximum hourly average concentrations above the value of the standard, averaged over a three-year period, is less than or equal to one.
g The PM10 standard is attained when the expected number of days with maximum hourly average concentrations above the value of the standard, averaged over a three-year period, is less than or equal to one.
h National standards are block averages rather than moving averages.
I CO, $NO_2$, $O^3$, and $PM_{10}$ are transportation related pollutants
Sources: National - 40 CFR 50. Virginia - 9 VAC 5, Chapter 30.

#### 4.6.1.4 Conformity with the Virginia SIP

Under the Clean Air Act, it is the responsibility of federal agencies, such as FTA, to ensure that a proposed project conforms to the SIP. Because the study area is located in an ozone non-attainment area, a conformity determination is required under Section 176(C) of the Clean Air Act.

A project conforms if it comes from a conforming metropolitan transportation plan and if it does not cause or contribute to any localized violations of the NAAQS for carbon monoxide (CO). The MWCOG Transportation Planning Board has included the Dulles Corridor Rapid Transit Project (Metrorail Alternative) in its long-range transportation plan, and that plan has been found to conform to the relevant SIPs (i.e., those of Virginia, Maryland, and D.C.). FHWA and FTA have concurred in that conformity determination for the metropolitan Washington transportation plan. The second major conformity criterion, the analysis of potential CO hotspots, is addressed in Section 4.6.2 below.

The transportation improvement plan for the region is the Constrained Long-Range Plan (CLRP) prepared by the MWCOG Transportation Planning Board. The project is included in the CLRP, and therefore, the project conforms to the SIP, subject to continued approval of the plan by FTA and EPA, and eventual full inclusion in an approved and conforming TIP. Near-term phases of the project are included in an approved conforming TIP (FY 01). As the dates for implementation of the later phases of the project approach, they will be included in approved and conforming TIPs.

### 4.6.2 ANALYSIS METHODS

The analysis methodology consisted of an intersection assessment and a dispersion modeling analysis for computing CO concentrations at candidate intersections along the corridor. The study area for air quality is the intersections modeled.

#### Intersection Screening

Motor vehicles emit CO at the highest rates when they are operating at low speeds or idling. For this reason, the potential for adverse air quality impacts is greatest at intersections where traffic is most congested. An initial screening of the signalized traffic intersections in the traffic study area was performed that identified intersections where traffic volumes would be likely to increase due to the project. Based on the results of this initial intersection screening, the 15 sites listed in Table 4.6-2 were selected for analysis. Figure 4.6-1 illustrates the location of the intersections that were used in this analysis. For this Draft EIS, the intersection screening methods were based on EPA criteria in the *Guideline for Modeling Carbon Monoxide from Roadway Intersections* (November 1992).

**Table 4.6-2: Intersections Modeled for Air Quality Impacts**

| I.D. No. | Intersection |
|---|---|
| Tysons Corner Area | |
| 1 | Route 123/Colshire Drive |
| 2 | Route 123/Tysons Boulevard |
| 3 | Route 123/International Drive |
| 4 | Westpark Drive/International Drive |
| 5 | Route 7/Westpark Drive |
| 6 | Route 7/Spring Hill Road |
| 7 | Route 7/Tyco Road/Westwood Center Drive |
| Mid Corridor Area | |
| 8 | Wiehle Avenue/Sunset Hills Road |
| 9 | Reston Parkway/Sunset Hills Road |
| 10 | Reston Parkway/Dulles Toll Road – EB Ramps |
| 11 | Reston Parkway/Sunrise Valley Drive |
| 12 | Sunrise Valley Drive/Fairfax County Parkway |
| 13 | Monroe Street/Sunrise Valley Drive |
| 14 | Centreville Road/Worldgate Drive |
| Loudoun County | |
| 15 | Route 606 Park-and-Ride Facility |

In addition to the intersection analysis, a typical park-and-ride facility was modeled to assess the potential air quality impacts of such facilities. The Route 606 Park-and-Ride facility was selected as a worst-case representative under the Metrorail Alternative because by 2025 it would be the largest park-and-ride facility, and experience a high ratio of demand to capacity. The Route 606 facility is likely to experience a high degree of traffic congestion and, consequently, high CO concentration levels. The park-and-ride analysis also includes the adjacent intersections of Route 789/Lockridge Road with the park-and-ride entrance road and the park-and-ride exit road.

### Modeling Analysis

At each of the intersections selected for detailed air quality modeling, maximum one-hour and eight-hour CO concentrations were predicted at several locations (receptors) in the vicinity of the intersection where the maximum concentrations would be expected and where the public would have reasonable access. In accordance with EPA's 1992 guidelines, receptors were placed on the sidewalk on both sides of each approach to the intersection, outside of the mixing zones of the free-flow links being modeled. At the Route 606 Park-and-Ride facility, receptors were also placed on the sidewalks adjacent to the parking lots and garage and in the bus waiting area. Where applicable, additional receptors were placed at nearby locations with sensitive land uses such as residences, businesses, and other areas where the public would have reasonable access.

Emission factors for motor vehicles were generated using EPA's computer program MOBILE5b. The input parameter values for MOBILE5b were selected in accordance with MWCOG guidance. The major input parameters and their values are summarized in the *Air Quality Technical Report* (June 2002). An Appendix to the Technical Report provides copies of the MOBILE5b input and output files.

Maximum one- and eight-hour CO concentrations were predicted using EPA's CAL3QHC Version 2.0 dispersion model. Specific modeling inputs were selected in accordance with MWCOG guidance. The modeling for 2006, 2010, and 2025 accounts for roadway improvements proposed by the Virginia Department of Transportation (VDOT) at several of the intersections in the study area. Complete CAL3QHC analysis assumptions and the detailed modeling results can be found in the *Air Quality Technical Report* (June 2002).

## 4.6.3 EXISTING CONDITIONS

This section summarizes measured ambient air quality data for the region including the study area. VDEQ maintains a statewide network of monitoring stations that routinely measure pollutant concentrations in the ambient air. These stations provide data to assess compliance with the NAAQS and Virginia Ambient Air Quality Standards and to evaluate the effectiveness of pollution control strategies. The monitored pollutants are ozone, $NO_2$, CO, $PM_{10}$, and $SO_2$. Table 4.6-3 presents the maximum measured concentrations for these pollutants measured at representative monitoring stations nearest to the study area, as reported by VDEQ for the most recent full year of data (2000). Figure 4.6-2 shows the locations of these monitoring stations.

As shown in Table 4.6-3, the highest one-hour ozone concentration in the region near the study area in 2000 was 0.112 parts per million (ppm) measured at the Lewinsville monitoring station. This level is below the one-hour ozone standard of 0.12 ppm. There were no exceedances of the ozone standard at the Lewinsville station site in 2000. This area of Virginia is currently classified as a Severe Ozone Non-attainment Area due to past violations of the ozone standard. For example, the 1-hour ozone NAAQS was exceeded at VDEQ monitors in northern Virginia on 9 days in 1998, 8 days in 1999, and 1 day in 2000. The number of violations of the ozone standard has been generally decreasing over time as a result of emission controls mandated by the Clean Air Act and the Virginia SIP. The Washington metropolitan region is in attainment for the other pollutants listed.

**Table 4.6-3: 2000 Monitored Ambient Air Quality in the Region**

| Pollutant | Monitor Location (City) | Averaging Period | Maximum Concentration | Second Maximum Concentration |
|---|---|---|---|---|
| Carbon Monoxide | Lewinsville[a] | 1 Hour<br>8 Hours | 6.5 ppm<br>3.8 ppm | 5.6 ppm<br>3.5 ppm |
| Nitrogen Dioxide | Lewinsville | Annual | 0.021 ppm | Not applicable |
| | Ashburn[b] | Annual | 0.013 ppm | Not applicable |
| Ozone | Lewinsville | 1 Hour | 0.112 ppm | 0.105 ppm |
| | Ashburn | 1 Hour | 0.100 ppm | 0.088 ppm |
| Particulate Matter (PM10) | Chantilly[c] | 24 Hours<br>Annual | 53 μg/m3<br>19.1 μg/m3 | 45 μg/m3<br>Not applicable |
| Sulfur Dioxide | Lewinsville | 3 Hours<br>24 Hours<br>Annual | 0.057 ppm<br>0.037 ppm<br>0.010 ppm | 0.049 ppm<br>0.030 ppm<br>Not applicable |
| Lead | Washington, D.C.[d] | 24 Hours | I/D[e] | I/D[e] |

a Lewinsville monitoring station is located in Fairfax County at McLean Government Center, 1437 Balls Hill Road. EPA AIRS I.D. number 51-059-5001. VDEQ I.D. number L-46-A8.
b Ashburn monitoring station is located in Loudoun County at Broad Run High School, Ashburn Road (Route 641). EPA AIRS I.D. number 51-107-1005. VDEQ I.D. number 38-I.
c Chantilly monitoring station is located in Fairfax County at Cub Run Treatment Plant, Upper Cub Run Drive. EPA AIRS I.D. 51-059-0005. VDEQ I.D. number L-46-F.
d Washington, D.C. monitoring station is located in the District of Columbia on Indiana Ave. NW. EPA AIRS I.D. 11-001-1000.
e Insufficient Data, only one sample collected during calendar year 2000 at this station.
Source: Virginia Department of Environmental Quality, as reported to U.S. Environmental Protection Agency AIRData website (http:www.epa.gov/airweb). Monitor Values Report accessed March 23, 2001.

## 4.6.4 LONG-TERM EFFECTS

The air quality analysis consists of three components, as mandated by EPA: a dispersion modeling analysis to estimate maximum one-hour and eight-hour carbon monoxide (CO) concentrations at selected roadway traffic intersections in the study area; a similar modeling analysis to estimate CO levels in the vicinity of a typical park-and-ride facility; and an assessment of the potential for localized impacts from the proposed maintenance facilities.

For the intersections and the park-and-ride facility analyses, CO concentrations were evaluated for 2000, and the Baseline Alternative, and the four Build Alternatives. Because the project could be built in phases, the future conditions were analyzed with 2006 as the opening year for the BRT and BRT/Metrorail alternatives, 2010 as the opening year for the full Metrorail Alternative, and 2025 as the project design year for all alternatives.

Although there may be concern about severe traffic congestion along major highways of the area, there are currently no federal or state regulations or requirements to analyze the CO concentration along highway mainlines. Furthermore, the adverse levels of CO due to traffic on highway mainlines are very unlikely to occur for two reasons: (1) recent model year vehicles have relatively low emission rates, and (2) the rapid drop off of CO concentrations due to the large distances between the travel lanes and receptors located beyond the highway right-of-way. For these reasons, EPA and VA DEQ do not require assessment of CO concentrations from highway mainlines.

### 4.6.4.1 Baseline Alternative

Tables 4.6-4 and 4.6-5 show the maximum predicted one- and eight-hour CO concentrations, respectively, for the Baseline Alternative. These concentrations were also predicted for the existing conditions in 2000, 2006, 2010, and 2025, to indicate air quality trends at the intersections over time.

Figure 4.6-2

# DEQ Air Quality Monitoring Stations

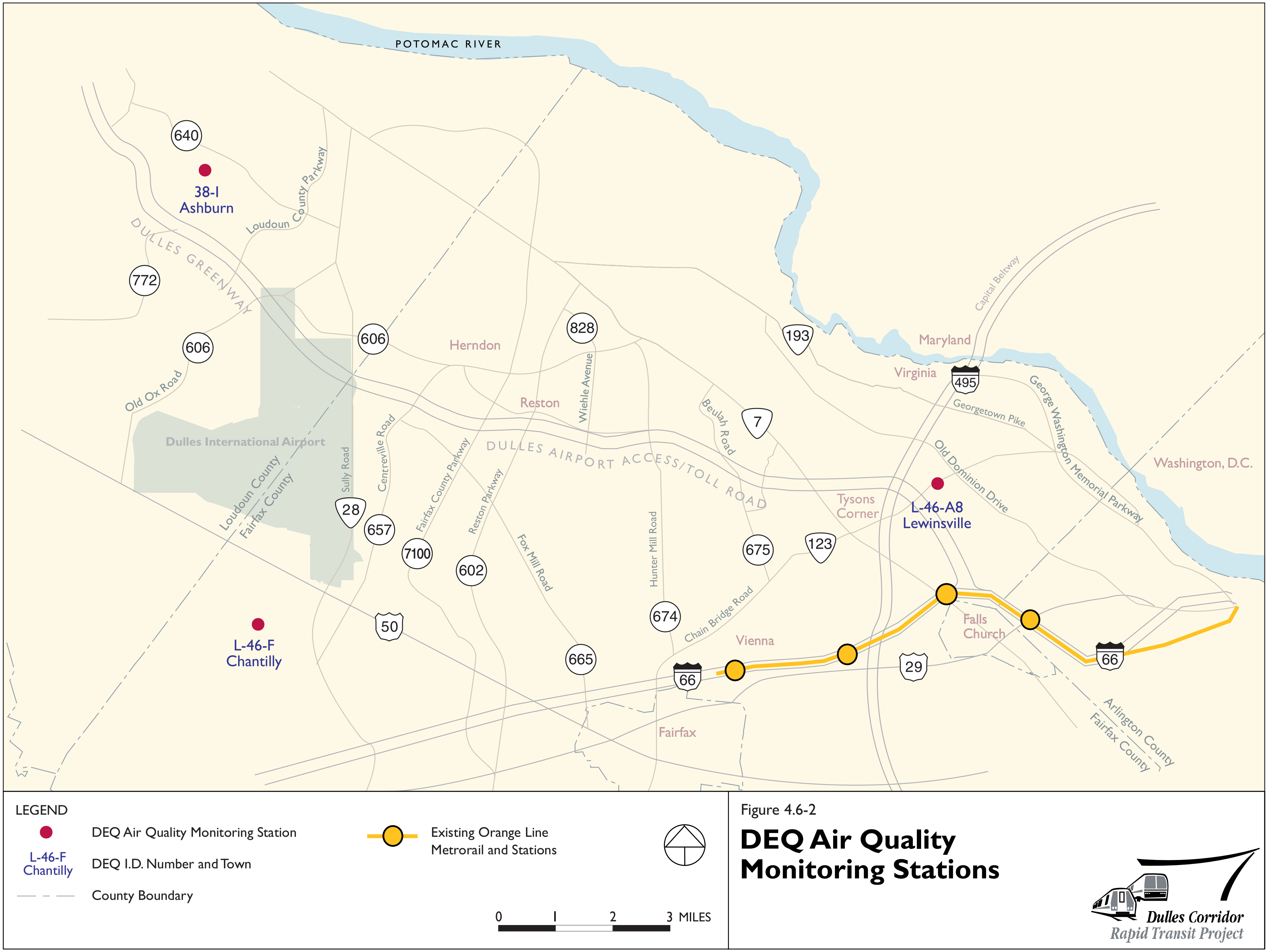


**Table 4.6-4: Maximum Predicted 1-Hour CO Concentrations (in ppm) for Baseline Alternative[1]**

| I.D. No. | Intersection | Existing 2000 | Baseline Alternative 2006 | 2010 | 2025 |
|---|---|---|---|---|---|
| Tysons Corner Area | | | | | |
| 1 | Route 123/Colshire Drive | 10.3 | 9.2 | 8.4 | 7.7 |
| 2 | Route 123/Tysons Boulevard | 11.0 | 9.5 | 8.8 | 8.4 |
| 3 | Route 123/International Drive | 11.9 | 10.3 | 8.9 | 8.4 |
| 4 | Westpark Drive/International Drive | 10.0 | 8.8 | 8.9 | 8.1 |
| 5 | Route 7/Westpark Drive | 10.4 | 9.1 | 8.8 | 8.4 |
| 6 | Route 7/Spring Hill Road | 11.4 | 9.5 | 9.2 | 8.7 |
| 7 | Route 7/Tyco Road/Westwood Center Drive | 11.6 | 10.2 | 9.2 | 8.5 |
| Mid Corridor Area | | | | | |
| 8 | Wiehle Avenue/Sunset Hills Road | 11.0 | 9.6 | 8.7 | 8.4 |
| 9 | Reston Parkway/Sunset Hills Road | 11.8 | 10.2 | 8.9 | 8.4 |
| 10 | Reston Parkway/Dulles Toll Road – EB Ramps | 9.6 | 9.2 | 8.3 | 7.9 |
| 11 | Reston Parkway/Sunrise Valley Drive | 12.4 | 10.5 | 9.4 | 8.8 |
| 12 | Sunrise Valley Drive/Fairfax County Parkway | 11.5 | 10.1 | 9.2 | 8.6 |
| 13 | Monroe Street/Sunrise Valley Drive | 10.3 | 9.4 | 8.5 | 8.0 |
| 14 | Centreville Road/Worldgate Drive | 11.2 | 9.6 | 8.7 | 8.3 |
| Loudoun County | | | | | |
| 15 | Route 606 Park-and-Ride Facility | n.a.[2] | n.a.[2] | n.a.[2] | n.a.[2] |

1 NAAQS is 35 ppm for 1-hour CO concentrations
2 Not applicable. The park-and-ride facility does not exist in the Baseline Alternative.

**Table 4.6-5: Maximum Predicted 8-Hour CO Concentrations (in ppm) for Baseline Alternative[1]**

| I.D. No. | Intersection | Existing 2000 | Baseline Alternative 2006 | 2010 | 2025 |
|---|---|---|---|---|---|
| Tysons Corner Area | | | | | |
| 1 | Route 123/Colshire Drive | 6.0 | 5.2 | 4.7 | 4.2 |
| 2 | Route 123/Tysons Boulevard | 6.5 | 5.1 | 4.7 | 4.4 |
| 3 | Route 123/International Drive | 7.1 | 6.0 | 5.0 | 4.7 |
| 4 | Westpark Drive/International Drive | 5.8 | 5.0 | 5.0 | 4.5 |
| 5 | Route 7/Westpark Drive | 6.1 | 5.2 | 5.0 | 4.7 |
| 6 | Route 7/Spring Hill Road | 6.8 | 5.4 | 5.2 | 4.9 |
| 7 | Route 7/Tyco Road/Westwood Center Drive | 6.9 | 5.9 | 5.2 | 4.8 |
| Mid Corridor Area | | | | | |
| 8 | Wiehle Avenue/Sunset Hills Road | 6.5 | 5.5 | 4.9 | 4.7 |
| 9 | Reston Parkway/Sunset Hills Road | 7.1 | 5.9 | 5.0 | 4.7 |
| 10 | Reston Parkway/Dulles Toll Road – EB Ramps | 5.5 | 5.2 | 4.6 | 4.3 |
| 11 | Reston Parkway/Sunrise Valley Drive | 7.5 | 6.2 | 5.4 | 5.0 |
| 12 | Sunrise Valley Drive/Fairfax County Parkway | 6.9 | 5.9 | 5.2 | 4.8 |
| 13 | Monroe Street/Sunrise Valley Drive | 6.0 | 5.4 | 4.8 | 4.4 |
| 14 | Centreville Road/Worldgate Drive | 6.6 | 5.5 | 4.9 | 4.6 |
| Loudoun County | | | | | |
| 15 | Route 606 Park-and-Ride Facility | n.a.[2] | n.a.[2] | n.a.[2] | n.a.[2] |

1 NAAQS is 9 ppm for 8-hour concentrations
2 The park-and-ride facility does not exist in the Baseline Alternative.

### Predicted CO Concentrations: Intersections

For the 2006 Baseline Alternative, the maximum predicted one- and eight-hour CO concentrations occurred at site Number 11, Reston Parkway and Sunrise Valley Drive, and are 10.5 ppm and 6.2 ppm, respectively. Predicted one-hour CO concentrations at the remaining sites ranged from 8.8 ppm to 10.3 ppm. Predicted eight-hour CO concentrations at the remaining sites ranged from 5.0 to 6.0 ppm.

For the 2010 Baseline Alternative, the maximum predicted one- and eight-hour CO concentrations occurred at site Number 11, Reston Parkway and Sunrise Valley Drive, and are 9.4 ppm and 5.4 ppm, respectively. Predicted one-hour CO concentrations at the remaining sites ranged from 8.3 ppm to 9.2 ppm. Predicted eight-hour CO concentrations at the remaining sites ranged from 4.6 to 5.2 ppm.

For the 2025 Baseline Alternative, the maximum one-hour CO concentration in the project study area was predicted to be 8.8 ppm and occurred at Site Number 11, at the intersection of Reston Parkway and Sunrise Valley Drive. The maximum predicted eight-hour CO concentration was 5.0 ppm and occurred at the same intersection. Predicted one-hour CO concentrations at the remaining intersections ranged from 7.7 ppm to 8.7 ppm. Predicted eight-hour CO concentrations at the remaining intersections ranged from 4.2 ppm to 4.9 ppm.

All predicted CO concentrations for the 2000 Existing Conditions and for the 2025 Baseline Alternative are less than the NAAQS of 35 ppm for one hour and 9 ppm for eight hours.

The maximum one- and eight-hour CO levels for the 2025 Baseline Alternative are also lower than the corresponding levels for the 2000 Existing Conditions. This decrease in CO concentrations is mainly due to the decrease in the exhaust emission factors from 2000 to 2025, as older and more polluting vehicles in the nation's fleet are replaced with new vehicles which have lower emission rates, as prescribed in the Federal Motor Vehicles Emission Control Program (FMVECP) mandated in the Clean Air Act. For example, the vehicle idle emission factor is predicted to decrease by 61 percent from the 2000 Existing Conditions to the 2025 Baseline Alternative, even though hourly traffic volumes are expected to increase at all the modeled intersections between 2000 and 2025. This reduction in the vehicle emission rates more than offsets the increase in traffic volumes from 2000 to 2025.

### Predicted CO Concentrations: Park-and-Ride

The Route 606 Park-and-Ride Facility is not modeled in the 2000 Existing Conditions and the 2025 Baseline Alternative, as the facility does not currently exist and would not be built separately from the Build Alternatives.

### Predicted CO Concentrations: Maintenance Facilities

No new maintenance facilities would be constructed under the Baseline Alternative.

## 4.6.4.2 BRT Alternative

Tables 4.6-6 and 4.6-7 show the maximum predicted CO concentrations for the BRT Alternative, as well as the predicted concentrations for the existing conditions in 2000.

### Predicted CO Concentrations: Intersections

For the 2006 BRT Alternative, the maximum predicted one- and eight-hour CO concentrations of 10.5 and 6.2, respectively occurred at Site Number 11, Reston Parkway and Sunrise Valley Drive. Predicted one-hour CO concentrations at the remaining sites ranged from 8.8 ppm to 10.3 ppm. Predicted eight-hour CO concentrations at the remaining sites ranged from 5.0 ppm to 6.0 ppm.

**Table 4.6-6: Maximum Predicted 1-Hour CO Concentrations (in ppm) for BRT Alternative[1]**

| I.D. No. | Intersection | Existing 2000 | BRT Alternative | |
|---|---|---|---|---|
| | | | 2006 | 2025 |
| Tysons Corner Area | | | | |
| 1 | Route 123/Colshire Drive | 10.3 | 9.2 | 7.7 |
| 2 | Route 123/Tysons Boulevard | 11.0 | 9.5 | 8.4 |
| 3 | Route 123/International Drive | 11.9 | 10.3 | 8.2 |
| 4 | Westpark Drive/International Drive | 10.0 | 8.8 | 8.1 |
| 5 | Route 7/Westpark Drive | 10.4 | 9.1 | 8.3 |
| 6 | Route 7/Spring Hill Road | 11.4 | 9.5 | 8.7 |
| 7 | Route 7/Tyco Road/Westwood Center Drive | 11.6 | 9.8 | 8.5 |
| Mid Corridor Area | | | | |
| 8 | Wiehle Avenue/Sunset Hills Road | 11.0 | 9.6 | 8.5 |
| 9 | Reston Parkway/Sunset Hills Road | 11.8 | 10.3 | 8.5 |
| 10 | Reston Parkway/Dulles Toll Road – EB Ramps | 9.6 | 9.2 | 8.1 |
| 11 | Reston Parkway/Sunrise Valley Drive | 12.4 | 10.5 | 8.8 |
| 12 | Sunrise Valley Drive/Fairfax County Parkway | 11.5 | 10.3 | 9.0 |
| 13 | Monroe Street/Sunrise Valley Drive | 10.3 | 9.4 | 8.4 |
| 14 | Centreville Road/Worldgate Drive | 11.2 | 9.8 | 8.5 |
| Loudoun County | | | | |
| 15 | Route 606 Park-and-Ride Facility | n.a.[2] | n.a.[2] | 9.9 |

1 NAAQS is 35 ppm for 1-hour CO concentrations
2 Not applicable. The park-and-ride facility is not present in the selected year.

**Table 4.6-7: Maximum Predicted 8-Hour CO Concentrations (in ppm) for BRT Alternative[1]**

| I.D. No. | Intersection | Existing 2000 | BRT Alternative | |
|---|---|---|---|---|
| | | | 2006 | 2025 |
| Tysons Corner Area | | | | |
| 1 | Route 123/Colshire Drive | 6.0 | 5.2 | 4.2 |
| 2 | Route 123/Tysons Boulevard | 6.5 | 5.1 | 4.4 |
| 3 | Route 123/International Drive | 7.1 | 6.0 | 4.5 |
| 4 | Westpark Drive/International Drive | 5.8 | 5.0 | 4.5 |
| 5 | Route 7/Westpark Drive | 6.1 | 5.2 | 4.6 |
| 6 | Route 7/Spring Hill Road | 6.8 | 5.4 | 4.9 |
| 7 | Route 7/Tyco Road / Westwood Center Drive | 6.9 | 5.7 | 4.8 |
| Mid Corridor Area | | | | |
| 8 | Wiehle Avenue/Sunset Hills Road | 6.5 | 5.5 | 4.8 |
| 9 | Reston Parkway/Sunset Hills Road | 7.1 | 6.0 | 4.8 |
| 10 | Reston Parkway/Dulles Toll Road – EB Ramps | 5.5 | 5.2 | 4.5 |
| 11 | Reston Parkway/Sunrise Valley Drive | 7.5 | 6.2 | 5.0 |
| 12 | Sunrise Valley Drive/Fairfax County Parkway | 6.9 | 6.0 | 5.1 |
| 13 | Monroe Street/Sunrise Valley Drive | 6.0 | 5.4 | 4.7 |
| 14 | Centreville Road/Worldgate Drive | 6.6 | 5.7 | 4.8 |
| Loudoun County | | | | |
| 15 | Route 606 Park-and-Ride Facility | n.a.[2] | n.a.[2] | 5.7 |

1 NAAQS is 9 ppm for 8-hour concentrations
2 Not applicable. The park-and-ride facility is not present in the selected year.

For the 2025 BRT Alternative, the maximum one-hour CO concentration in the project study area was predicted to be 9.0 ppm and occurred at Site Number 12, Sunrise Valley Drive and Fairfax County Parkway. The maximum predicted eight-hour CO concentration was 5.1 ppm and occurred at the same intersection. Predicted one-hour CO concentrations at the remaining intersections ranged from 7.7 ppm to 8.8 ppm. Predicted eight-hour CO concentrations at the remaining intersections ranged from 4.2 ppm to 5.0 ppm.

All predicted CO concentrations for the 2025 BRT Alternative are less than the NAAQS of 35 ppm for one hour and 9 ppm for eight hours. The maximum one- and eight-hour CO levels for the 2025 BRT Alternative are also lower than the corresponding levels for the 2000 Existing Conditions. This decrease in CO concentrations is mainly due to the decrease in the exhaust emission factors from 2000 to 2025 required by the FMVECP.

#### Predicted CO Concentrations: Park-and-Ride

The proposed park-and-ride facility at Route 606 is designed to provide parking for a maximum of 4,750 cars. Vehicle traffic at the facility would include buses and automobiles, and would typically be highest during the a.m. and p.m. peak commuting periods. Thus, CO emissions from idling and moving vehicles at the facility would be highest during those times.

The analysis of the park-and-ride facility included two components: 1) estimating CO concentrations at receptors located in the immediate vicinity of the facility to assess impacts from the facility itself; and 2) estimating CO concentrations near the two traffic intersections immediately next to the park-and-ride facility which would allow access into and out of the facility. The impacts for the BRT Alternative were evaluated for 2025 only, since the year 2025 is when the facility would be operating at its highest capacity.

Maximum predicted one- and eight-hour CO concentrations in the vicinity of the proposed Route 606 Park-and-Ride facility and the two intersections near the facility itself for the BRT Alternative in 2025 occurred at a receptor from the nearby intersections of Route 789 and the park-and-ride exit road, and are 9.9 ppm and 5.7 ppm, respectively

In summary, all predicted CO concentrations in the vicinity of the Route 606 Park-and-Ride facility for the 2025 BRT Alternative would be below the NAAQS one- and eight-hour standards of 35 ppm and 9 ppm, respectively.

#### Predicted Concentrations: Maintenance Facilities

The proposed BRT Maintenance and Storage Facility (Site 14) would provide full maintenance services for the BRT vehicles. These services could include major repairs and diesel engine work, welding, bodywork, and painting, as well as routine maintenance and overnight storage. Buses out of service for maintenance and repair would be worked on throughout the workday. The storage design capacity of the BRT facility is 75 buses.

The facility is assumed to operate in the same way as WMATA's existing bus facilities. In these facilities, bus activity is timed to accommodate the peak a.m. and p.m. demand periods, thus bus idling and traffic at the facility are highest during those times.

Potential air quality impacts of the proposed BRT Maintenance and Storage Facility were assessed using aerial photographs and site plans; data on surrounding land uses and nearby sensitive receptor locations; the proposed bus storage capacity; and the anticipated maintenance activities and their intensity at the site. The largest potential sources of emissions would likely be idling buses, diesel engine maintenance and test activities

occurring inside the main maintenance building, and volatile organic compounds emissions from the paint booth.

Most of the proposed boundary of the facility site abuts roadways, industrial/commercial uses, or undeveloped areas. The shortest distance from any residence to the nearest potential location of emissions from the BRT facility is well over 1,000 feet. At this distance, ambient pollutant concentrations caused by the facility would be low because of the dilution effects due to atmospheric dispersion; therefore no adverse air quality impacts would be experienced. The maintenance facility is not expected to cause any adverse air quality impacts at nearby residential receptors. However, some of the proposed maintenance activities, such as paint booths, are anticipated to require air quality permits from VDEQ. Permits would be obtained as a separate activity after approval of the Final EIS. The VDEQ permit application process requires that potential air quality impacts such as odors from solvent evaporation be considered and mitigated if necessary.

With the BRT Alternative, the existing West Falls Church Station would be slightly reconfigured to accommodate the BRT vehicles, and a new BRT layover/welfare facility would be built within the infield of the Dulles Connector Road/I-66 interchange, just east of the existing West Falls Church S&I Yard. No changes are proposed to the West Falls Church S&I Yard. The nearest sensitive receptors to any of the new or modified facilities are residences located to the east, across the northbound lanes of the Dulles Connector Road, about 350 feet from the bus parking area at the BRT layover/welfare facility. At this distance, no adverse air quality impacts would be expected due to the proposed station modification and BRT layover/welfare facility.

#### 4.6.4.3 Metrorail Alternative

Tables 4.6-8 and 4.6-9 show the maximum predicted CO concentrations for the Metrorail Alternative, as well as the predicted concentrations for existing conditions in 2000.

**Table 4.6-8: Maximum Predicted 1-Hour CO Concentrations (in ppm) for Metrorail Alternative[1]**

| I.D. No. | Intersection | Existing 2000 | Metrorail Alternative | |
|---|---|---|---|---|
| | | | 2010 | 2025 |
| Tysons Corner Area | | | | |
| 1 | Route 123/Colshire Drive | 10.3 | 8.4 | 7.8 |
| 2 | Route 123/Tysons Boulevard | 11.0 | 8.7 | 8.3 |
| 3 | Route 123/International Drive | 11.9 | 8.6 | 8.0 |
| 4 | Westpark Drive/International Drive | 10.0 | 8.9 | 8.1 |
| 5 | Route 7/Westpark Drive | 10.4 | 8.7 | 8.3 |
| 6 | Route 7/Spring Hill Road | 11.4 | 9.2 | 8.3 |
| 7 | Route 7/Tyco Road / Westwood Center Drive | 11.6 | 9.1 | 8.4 |
| Mid Corridor Area | | | | |
| 8 | Wiehle Avenue/Sunset Hills Road | 11.0 | 8.6 | 8.5 |
| 9 | Reston Parkway/Sunset Hills Road | 11.8 | 9.3 | 8.5 |
| 10 | Reston Parkway/Dulles Toll Road – EB Ramps | 9.6 | 8.4 | 8.0 |
| 11 | Reston Parkway/Sunrise Valley Drive | 12.4 | 10.5 | 8.8 |
| 12 | Sunrise Valley Drive/Fairfax County Parkway | 11.5 | 9.4 | 8.9 |
| 13 | Monroe Street/Sunrise Valley Drive | 10.3 | 8.8 | 8.4 |
| 14 | Centreville Road/Worldgate Drive | 11.2 | 8.7 | 8.4 |
| Loudoun County | | | | |
| 15 | Route 606 Park-and-Ride Facility | n.a.[2] | 11.7 | 11.2 |

1 NAAQS is 35 ppm for 1-hour CO concentrations
2 Not applicable. The park-and-ride facility does not exist in the selected year.

**Table 4.6-9: Maximum Predicted 8-Hour CO Concentrations (in ppm) for Metrorail Alternative[1]**

| I.D. No. | Intersection | Existing 2000 | Metrorail Alternative | |
|---|---|---|---|---|
| | | | 2010 | 2025 |
| Tysons Corner Area | | | | |
| 1 | Route 123/Colshire Drive | 6.0 | 4.7 | 4.3 |
| 2 | Route 123/Tysons Boulevard | 6.5 | 4.6 | 4.4 |
| 3 | Route 123/International Drive | 7.1 | 4.8 | 4.4 |
| 4 | Westpark Drive/International Drive | 5.8 | 5.0 | 4.5 |
| 5 | Route 7/Westpark Drive | 6.1 | 4.9 | 4.6 |
| 6 | Route 7/Spring Hill Road | 6.8 | 5.2 | 4.6 |
| 7 | Route 7/Tyco Road/Westwood Center Drive | 6.9 | 5.2 | 4.7 |
| Mid Corridor Area | | | | |
| 8 | Wiehle Avenue/Sunset Hills Road | 6.5 | 4.8 | 4.8 |
| 9 | Reston Parkway/Sunset Hills Road | 7.1 | 5.3 | 4.8 |
| 10 | Reston Parkway/Dulles Toll Road – EB Ramps | 5.5 | 4.7 | 4.4 |
| 11 | Reston Parkway/Sunrise Valley Drive | 7.5 | 6.2 | 5.0 |
| 12 | Sunrise Valley Drive/Fairfax County Parkway | 6.9 | 5.4 | 5.0 |
| 13 | Monroe Street/Sunrise Valley Drive | 6.0 | 5.0 | 4.7 |
| 14 | Centreville Road/Worldgate Drive | 6.6 | 4.9 | 4.7 |
| Loudoun County | | | | |
| 15 | Route 606 Park-and-Ride Facility | n.a.[2] | 7.0 | 6.6 |

1 NAAQS is 9 ppm for 8-hour CO concentrations
2 Not applicable. The park-and-ride facility does not exist in the selected year.

### Predicted CO Concentrations: Intersections

The air quality modeling analysis for the Metrorail Alternative was conducted in the same way as for the Baseline and BRT alternatives. The project team predicted that Tysons Corner Alignment T6 would result in the worst traffic LOS (see Chapter 6), and consequently the highest CO concentrations of all the alignments under consideration for this alternative. Therefore, the traffic data for Alignment T6 was used in the air quality analysis for the Metrorail Alternative. Carbon monoxide concentrations with the other alignments would be expected to be lower than those reported here.

For the 2010 Metrorail Alternative, the maximum predicted one- and eight-hour CO concentrations occurred at Site Number 11, Reston Parkway and Sunrise Valley Drive, and are 10.5 ppm and 6.2 ppm, respectively. Predicted one-hour CO concentrations at the remaining sites ranged from 8.4 ppm to 9.4 ppm. Predicted eight-hour CO concentrations at the remaining sites ranged from 4.6 ppm to 5.4 ppm.

For the 2025 Metrorail Alternative, the maximum one-hour CO concentration in the project study area was predicted to be 8.9 ppm and occurred at Site Number 12, Sunrise Valley Drive and Fairfax County Parkway. The maximum predicted eight-hour CO concentration was 5.0 ppm and occurred at two locations: Site Number 11, Reston Parkway and Sunrise Valley Drive, and Site Number 12, Sunrise Valley Drive and Fairfax County Parkway. Predicted one-hour CO concentrations at the remaining intersections ranged from 7.8 ppm to 8.8 ppm. Predicted eight-hour CO concentrations at the remaining intersections ranged from 4.3 ppm to 4.8 ppm.

All predicted CO concentrations for the 2025 Metrorail Alternative are less than the NAAQS of 35 ppm for one hour and 9.0 ppm for eight hours. The maximum one- and eight-hour CO levels for the 2025 Metrorail Alternative are also lower than the corresponding levels for the 2000 Existing Conditions, despite the increase in hourly traffic volumes at all the modeled intersections from 2000 to 2025.

### Predicted CO Concentrations: Park-and-Ride

The analysis of the Route 606 Park-and-Ride facility for the Metrorail Alternative was conducted in the same way as for the BRT and BRT/Metrorail alternatives. Maximum predicted one- and eight-hour CO concentrations in the vicinity of the Route 606 Park-and-Ride facility and at the two intersections near the facility for the Metrorail Alternative are shown in Tables 4.6-8 and 4.6-9, respectively.

The maximum predicted one- and eight-hour CO concentrations from the facility in 2010 occurred at a receptor located near the intersection of Route 789 and the park-and-ride exit road, and are 11.7 ppm and 7.0 ppm, respectively.

The maximum predicted one- and eight-hour CO concentrations from the facility for the Metrorail Alternative in 2025 occurred at a receptor also located near the intersection of Route 789 and the park-and-ride exit road, and are 11.2 ppm and 6.6 ppm, respectively.

In summary, all predicted CO concentrations in the vicinity of the Route 606 Park-and-Ride facility for the 2010 and the 2025 Metrorail Alternative are below the NAAQS one- and eight-hour standards of 35 ppm and 9.0 ppm, respectively.

### Predicted Concentrations: S&I Yards

Additional storage tracks and new rail connections would be constructed at West Falls Church S&I Yard. Air quality impacts at the West Falls Church S&I Yard with the Metrorail Alternative would reflect the distribution of service activities between the West Falls Church S&I Yard and the proposed new S&I Yards in Loudoun County. To the extent that servicing is done at the proposed rail yard instead of at West Falls Church S&I Yard, the impacts at West Falls Church S&I Yard with the Metrorail Alternative would be similar to or less than the impacts with the BRT Alternative. No adverse air quality impacts are anticipated in the vicinity of the West Falls Church S&I Yard with the Metrorail Alternative.

Three alternative Metrorail S&I Yard sites were investigated. The alternative sites are located in Loudoun County and include: Site 7 located off Loudoun County Parkway (Route 607), north of the Dulles Greenway; Site 15, which is located on the east side of Route 606 on Dulles Airport property; and Site 20, which is located on the west side of Route 606 just south of Mercure Circle. The potential emission sources at the proposed rail yard would be similar to those at the West Falls Church S&I Yard. The emission sources that would operate at the proposed rail yard would be typical of such facilities. Rail vehicle maintenance may include major and minor repairs such as electrical work, welding, wheel grinding, bodywork, and painting, as well as routine maintenance and overnight storage.

The majority of the proposed boundaries of the S&I Yard sites abut roadways, industrial/commercial uses, or undeveloped areas. The nearest residence to S&I Yard 7 is located about 2.500 feet from the closest potential source of emissions at that site. The nearest residence to Site 15 is located approximately 3,400 feet from the closest potential source of emissions at that site. The nearest residence to Site 20 is located about 2,100 feet from the nearest potential source of emissions on that site. At these distances, ambient pollutant concentrations caused by the facility would be low because of the dilution effects due to atmospheric dispersion. Therefore, no

adverse air quality impacts would be experienced from the proposed sites. Moreover, some of the proposed maintenance activities, such as paint booths, are anticipated to require air quality permits from VDEQ. Permits would be obtained as a separate activity after approval of the Final EIS. The VDEQ permit application process requires that potential air quality impacts such as odors from solvent evaporation be considered and mitigated if necessary.

#### 4.6.4.4 BRT/Metrorail Alternative

Tables 4.6-10 and 4.6-11 show the maximum predicted CO concentrations for the BRT/Metrorail Alternative, as well as the predicted concentrations for the Existing Conditions in 2000.

##### Predicted CO Concentrations: Intersections

The project team predicted that Tysons Corner Alignment T6 would result in the worst traffic LOS, and consequently the highest CO concentrations, of all the alignments under consideration for this alternative. Therefore, the traffic data for Alignment T6 was used in the air quality analysis for the BRT/Metrorail Alternative. Tables 4.6-10 and 4.6-11 provide the predicted CO concentrations with the BRT/Metrorail Alternative, Alignment T6. Carbon monoxide concentrations with the other alignments would be expected to be lower than those reported in Tables 4.6-10 and 4.6-11.

**Table 4.6-10: Maximum Predicted 1-Hour CO Concentrations (in ppm) for BRT/Metrorail Alternative[1]**

| I.D. No. | Intersection | Existing 2000 | BRT/Metrorail Alternative | |
|---|---|---|---|---|
| | | | 2006 | 2025 |
| Tysons Corner Area | | | | |
| 1 | Route 123/Colshire Drive | 10.3 | 9.5 | 7.8 |
| 2 | Route 123/Tysons Boulevard | 11.0 | 9.5 | 8.4 |
| 3 | Route 123/International Drive | 11.9 | 10.3 | 8.1 |
| 4 | Westpark Drive/International Drive | 10.0 | 8.8 | 8.0 |
| 5 | Route 7/Westpark Drive | 10.4 | 9.1 | 8.3 |
| 6 | Route 7/Spring Hill Road | 11.4 | 9.5 | 8.4 |
| 7 | Route 7/Tyco Road/Westwood Center Drive | 11.6 | 10.1 | 8.5 |
| Mid Corridor Area | | | | |
| 8 | Wiehle Avenue/Sunset Hills Road | 11.0 | 9.6 | 8.5 |
| 9 | Reston Parkway/Sunset Hills Road | 11.8 | 10.3 | 8.5 |
| 10 | Reston Parkway/Dulles Toll Road – EB Ramps | 9.6 | 9.2 | 8.0 |
| 11 | Reston Parkway/Sunrise Valley Drive | 12.4 | 10.5 | 8.8 |
| 12 | Sunrise Valley Drive/Fairfax County Parkway | 11.5 | 10.3 | 9.0 |
| 13 | Monroe Street/Sunrise Valley Drive | 10.3 | 9.4 | 8.4 |
| 14 | Centreville Road/Worldgate Drive | 11.2 | 9.7 | 8.4 |
| Loudoun County | | | | |
| 15 | Route 606 Park-and-Ride Facility | n.a.[2] | 9.9 | 9.8 |

1 NAAQS is 35 ppm for 1-hour CO concentrations
2 Not applicable. The park-and-ride facility does not exist in the selected year.

**Table 4.6-11: Maximum Predicted 8-Hour CO Concentrations (in ppm) for BRT/Metrorail Alternative[1]**

| I.D. No. | Intersection | Existing | BRT/Metrorail Alternative | |
|---|---|---|---|---|
| | | 2000 | 2006 | 2025 |
| Tysons Corner Area | | | | |
| 1 | Route 123/Colshire Drive | 6.0 | 5.4 | 4.3 |
| 2 | Route 123/Tysons Boulevard | 6.5 | 5.1 | 4.4 |
| 3 | Route 123/International Drive | 7.1 | 6.0 | 4.5 |
| 4 | Westpark Drive/International Drive | 5.8 | 5.0 | 4.4 |
| 5 | Route 7/Westpark Drive | 6.1 | 5.2 | 4.6 |
| 6 | Route 7/Spring Hill Road | 6.8 | 5.4 | 4.7 |
| 7 | Route 7/Tyco Road / Westwood Center Drive | 6.9 | 5.9 | 4.8 |
| Mid Corridor Area | | | | |
| 8 | Wiehle Avenue/Sunset Hills Road | 6.5 | 5.5 | 4.8 |
| 9 | Reston Parkway/Sunset Hills Road | 7.1 | 6.0 | 4.8 |
| 10 | Reston Parkway/Dulles Toll Road – EB Ramps | 5.5 | 5.2 | 4.4 |
| 11 | Reston Parkway/Sunrise Valley Drive | 7.5 | 6.2 | 5.0 |
| 12 | Sunrise Valley Drive/Fairfax County Parkway | 6.9 | 6.0 | 5.1 |
| 13 | Monroe Street/Sunrise Valley Drive | 6.0 | 5.4 | 4.7 |
| 14 | Centreville Road/Worldgate Drive | 7.4 | 5.6 | 4.7 |
| Loudoun County | | | | |
| 15 | Route 606 Park-and-Ride Facility | n.a.[2] | 5.7 | 5.7 |

1 NAAQS is 9 ppm for 8-hour CO concentrations
2 Not applicable. The park-and-ride facility does not exist in the selected year.

For the 2006 BRT/Metrorail Alternative, the maximum one- and eight-hour CO concentrations occurred at Site Number 11, Reston Parkway and Sunrise Valley Drive, and are 10.5 ppm and 6.2 ppm, respectively. Predicted one-hour CO concentrations at the remaining sites ranged from 8.8 ppm to 10.3 ppm. Predicted eight-hour CO concentrations at the remaining sites ranged from 5.0 ppm to 6.0 ppm.

For the 2025 BRT/Metrorail Alternative, the maximum one- hour CO concentration in the project study area was predicted to be 9.0 ppm and occurred at Site Number 12, Sunrise Valley Drive and Fairfax County Parkway. The maximum predicted eight-hour CO concentration was 5.1 ppm and occurred at the same intersection. Predicted one-hour CO concentrations at the remaining intersections ranged from 7.8 ppm to 8.8 ppm. Predicted eight-hour CO concentrations at the remaining intersections ranged from 4.3 ppm to 5.0 ppm.

All predicted CO concentrations for the 2025 BRT/Metrorail Alternative are less than the NAAQS of 35 ppm for one hour and 9.0 ppm for eight hours. The maximum one- and eight-hour CO levels for the 2025 BRT/Metrorail Alternative are also lower than the corresponding levels for the 2000 Existing Conditions. This decrease in CO concentrations is mainly due to the decrease in the exhaust emission factors from 2000 to 2025.

### Predicted CO Concentrations: Park-and-Ride

Potential air quality impacts of the park-and-ride facility with the BRT/Metrorail Alternative would be similar to the impacts of the BRT Alternative, reflecting continued BRT activity with the BRT/Metrorail Alternative.

The analysis of the Route 606 Park-and-Ride facility for the BRT/Metrorail Alternative was conducted in the same way as for the BRT Alternative. Maximum predicted one- and eight-hour CO concentrations in the vicinity of the Route 606 Park-and-Ride facility and at the two intersections near the facility for the BRT/Metrorail Alternative are shown in Tables 4.6-10 and 4.6-11, respectively.

The maximum predicted one- and eight-hour CO concentrations from the facility for the BRT/Metrorail Alternative in 2006 occurred at a receptor located near the intersections of Route 789 and the park-and-ride exit road, and are 9.9 ppm and 5.7 ppm, respectively. The maximum predicted one- and eight-hour CO concentrations from the facility for the BRT/Metrorail Alternative in 2025 also occurred at a receptor located near the intersections of Route 789 and the park-and-ride exit road, and are 9.8 ppm and 5.7 ppm, respectively.

In summary, all predicted CO concentrations in the vicinity of the Route 606 Park-and-Ride facility for the 2006 and 2025 BRT/Metrorail Alternative are below the NAAQS one- and eight-hour standards of 35 ppm and 9 ppm, respectively.

#### Predicted Concentrations: Metrorail S&I Yards and BRT Maintenance Facilities

The analysis of this facility for the BRT/Metrorail Alternative was conducted in the same way as for the BRT Alternative. Potential air quality impacts of the BRT facility with the BRT/Metrorail Alternative would be similar to or slightly less than the impacts of the BRT Alternative, reflecting the decrease in BRT activity and service requirements with the BRT/Metrorail Alternative.

The BRT/Metrorail Alternative does not include the modifications to the West Falls Church Station or the BRT layover/welfare facility that are proposed for the BRT Alternative.

The Metrorail vehicles for the BRT/Metrorail Alternative would be serviced at the existing Metrorail West Falls Church S&I Yard. Four new storage tracks would be constructed, in accordance with WMATA's 1972 General Plans for the yard, to accommodate the additional Metrorail vehicles. New rail connections would also be constructed to allow trains to access the yard directly from the north. Operations on these new track segments would not entail any new emissions or air quality impacts because the trains are electrically powered.

As a result of the additional train operations with the BRT/Metrorail Alternative, service activities at the West Falls Church S&I Yard would be expected to increase. Metrorail vehicle servicing includes major repairs, electrical work, welding, wheel grinding, bodywork, and painting, as well as routine maintenance and overnight storage. In many respects, the potential emissions would be similar to those at the BRT Maintenance and Storage Facility. However, the emissions from idling and testing of diesel engines at the BRT facility would be absent from the S&I Yard. The VDEQ permit status of the emission sources at the West Falls Church S&I Yard, as well as distances from the emission sources to sensitive receptors in the vicinity, would not change with the BRT/Metrorail Alternative. Accordingly, no adverse air quality impacts are anticipated in the vicinity of West Falls Church S&I Yard with the BRT/Metrorail Alternative.

### 4.6.4.5 Phased Implementation Alternative

Under the Phased Implementation Alternative, the final air quality effects would be the same as those for the Metrorail Alternative. Interim effects would be the same as the BRT Alternative during the period when BRT operates between the Orange Line and Loudoun County (see Table 4.6-6). These interim effects will change to those of the Metrorail Alternative as BRT service is first replaced from the Orange Line through Tysons Corner (see Table 4.6-10) and then between Tysons Corner and Loudoun County (see Table 4.6-8). The maximum CO levels reported above would apply only for the future years in which a specific alternative is in

operation. Additional effects as a result of first implementing BRT above those presented in the tables above are not anticipated. As stated above, CO concentrations are decreasing over time due to the decrease in emission exhaust factors required by the federal government.

### 4.6.5 CONSTRUCTION IMPACTS

Construction activities can result in short-term impacts on ambient air quality. These potential impacts include direct emissions from construction equipment and trucks, increased emissions from motor vehicles on the streets due to disruption of traffic flow, and fugitive dust emissions. These impacts would be temporary, and would affect only the immediate vicinity of the construction sites and their access routes. Emissions from project-related construction equipment and trucks would be much less than the total emissions from other industrial and transportation sources in the region, and therefore, are expected to be insignificant with respect to compliance with the NAAQS.

Roadway traffic disruption due to lane closures, detours, and construction vehicles accessing the sites can cause congestion, which can increase motor vehicle exhaust emissions. Fugitive dust emissions could occur during demolition, ground excavation, material handling and storage, movement of equipment at the site, and transport of material to and from the site. Fugitive dust would most likely be a problem during periods of intense activity and would be accentuated by windy and/or dry weather conditions. These impacts would be similar in nature for all the Build Alternatives, but would vary in the number and locations of affected sites according to the selection of the project alternative, the specific alignment, and the station sites.

The BRT Alternative would involve typical activities using standard construction equipment. These activities would be related mostly to construction of stations and ancillary facilities, and their connections to the Dulles Connector Road, the DAAR, and the Dulles Greenway, because the BRT vehicles would travel on these existing roads for almost the entire corridor.

The Metrorail Alternative would involve construction activities and equipment to support construction of railbed, tracks, and signals in the median of the Dulles Connector Road and the DAAR; Metrorail connections to the West Falls Church S&I Yard; traction power substations and tie-breaker stations; the elevated structures in Tysons Corner; and underground facilities for Alignments T1, T6, T9, T9 Design Option, and at Dulles Airport.

The BRT/Metrorail Alternative would involve the same activities and equipment as the BRT Alternative, but on a larger scale, because of the additional facilities and structures required for the rail portion of the project. Additional activities would include construction of the railbed, tracks, and signals in the median of the Dulles Connector Road and the DAAR; Metrorail connections to West Falls Church S&I Yard; traction power substations and tie-breaker stations; the elevated structures in Tysons Corner; and underground facilities for Alignments T1 and T6, T9, and T9 Design Option.

Construction of this alternative would involve the implementation of BRT and Metrorail over an extended period of time. Although the construction effects would be the same as those described above for the other three alternatives, the timing would be different. The effects of constructing Metrorail through Tysons Corner would add to the effects of constructing BRT between the Orange Line and Loudoun County. These effects would then be followed by the effects of constructing Metrorail from Tysons Corner to the end of the study area in Loudoun County. Small increases in fugitive dust and emissions from construction equipment would occur as a result of Phased Implementation over what is described above. This would occur as a result of the

demolition of the Spring Hill Road Station, the BRT ramps between the Tysons West Station, and extension of the construction period that would occur during Phased Implementation.

The construction techniques and equipment are expected to be similar for each alignment. Under these conditions, the total linear length of the track structures can be used to indicate the extent and amount of exposure of receptors to construction activities, and the associated potential for air quality impacts, with each alignment in Tysons Corner. An alignment with a greater linear length of structures would be expected to have a correspondingly greater potential for construction air quality impacts than would an alignment with a lesser linear length of structures.

On this basis, Alignment T4 would be expected to have the greatest potential for air quality impacts because of the length of the track configuration. In addition, Alignment T4 includes the largest number of stations. Alignments T1, T6, T9, and T9 Design Option would be expected to have generally lesser potential impacts than Alignment T4. The potential impacts of Alignments T6, T9, and T9 Design Option would be expected to be similar overall because both alignments are mostly elevated and include four stations. Alignment T6 has one station located underground. Compared to Alignment T9 and T9 Design Option, this configuration would eliminate impacts in the areas above the longer tunnel segment and underground station, but would increase the potential for localized impacts at the tunnel portals and station access shafts where equipment must enter and excavate must be removed. Alignment T1 includes the tunnel segment but only three stations, and accordingly, would be expected to have generally less potential impact than the other alignments.

On a corridor-wide basis, as the above discussion indicates, the potential air quality impacts due to construction of the BRT Alternative would be least, the impacts from construction of the BRT/Metrorail Alternative would be greater, and those of the Metrorail Alternative would be largest. For the Metrorail alignments in Tysons Corner, the expected potential impacts would be least with Alignment T1, somewhat greater with Alignments T6, T9, and T9 Design Option, and greatest with Alignment T4.

### 4.6.6 MITIGATION

Mitigation measures for predicted project emissions are proposed in the following subsections.

#### 4.6.6.1 Project Operation

With respect to regional emissions and conformity, the project is included in the conforming MWCOG CLRP. Therefore, the project conforms to the SIP, and no mitigation measures are necessary with respect to compliance with the transportation conformity requirements.

With respect to localized air quality impacts, the modeled one-hour and eight-hour CO concentrations were compared to the NAAQS. In order to demonstrate compliance with the ambient CO standards, predicted CO concentrations must not equal or exceed the NAAQS. Based on the analyses presented above, there would be no adverse air quality impacts associated with the operation of this project. Therefore, no mitigation measures are required for this project.

#### 4.6.6.2 Construction

Direct emissions from construction equipment would not be expected to produce adverse effects on local air quality provided that all equipment is properly operated and maintained. Appropriate mitigation could consist of assurance of proper operation and maintenance, specification of low-emissions equipment (EPA Tier 2 compliant, alternative-fueled, or retrofit with emissions controls), and prohibition of excessive idling of engines.

Traffic management techniques are available during the construction period that could mitigate increased emissions from traffic congestion due to lane closures, detours, and construction vehicles accessing sites. Examples of these techniques include development of site-specific traffic management plans; temporary signage and other traffic controls; designated staging areas, worker parking lots (with shuttle bus service if necessary), and truck routes; and prohibition of construction vehicle travel during peak traffic periods.

Potential fugitive dust impacts can be mitigated through good "housekeeping" practices such as water sprays during demolition; wetting, paving, landscaping, or chemically treating exposed earth areas; covering dust-producing materials during transport; limiting dust-producing construction activities during high wind conditions; and providing street sweeping and tire washes for trucks leaving the site. Such practices during construction would meet VDEQ regulations for fugitive dust and emissions as outlined in VDEQ regulation 9 VAC 5-50-90.

### 4.6.7 SUMMARY OF EFFECTS

A summary of the air quality effects is presented in Table 4.6-12.

**Table 4.6-12: Summary of Air Quality Effects**

| Alternative | Effect | Mitigation |
|---|---|---|
| Baseline | None | None |
| BRT | None | None |
| Metrorail | None | None |
| BRT/Metrorail | None | None |
| Phased Implementation | None | None |

## 4.7 NOISE

This chapter includes an introduction to basic noise concepts, including noise descriptors, the prediction methodologies and modeling assumptions used for the project, the results of the ambient noise monitoring program, and the evaluation of potential impacts along the Dulles Corridor. Additional information regarding study area noise is provided in the *Noise and Vibration Technical Report* (June 2002).

### 4.7.1 HUMAN PERCEPTION OF NOISE

The characteristics and properties of noise are explained in the following subsections.

#### 4.7.1.1 Describing Noise

Noise is "unwanted sound" and, by this definition, the perception of noise is a subjective process. Several factors affect the actual level and quality of sound (or noise) as perceived by the human ear and can generally be described in terms of loudness, pitch (or frequency), and time variation.

**Loudness**

The loudness, or magnitude, of noise determines its intensity and is measured in decibels (dB). The noise decibel is used to describe a large range of sound levels. For example, ambient noise ranges from 40 decibels (the rustling of leaves) to over 70 decibels (a truck passing by) to over 100 decibels (a rock concert).

### Pitch

Pitch describes the character and frequency content of noise. Measured in hertz (Hz), frequency is typically used to identify the annoying characteristics of noise and thereby identify mitigation to help eliminate or minimize its magnitude. The human ear is typically sensitive to noise frequencies between 20 Hz (low-pitched noise) and 20,000 Hz (high-pitched noise). For example, noise could range from the very low-pitched "rumbling" noise of stereo sub-woofers, to mid-range traffic noise, to very high-pitched whistle noise.

### Time Variation

The time variation of some noise sources can be characterized as continuous, such as a building ventilation fan, intermittent; such as for a train passby; or impulsive, like a car backfire.

### 4.7.1.2 Description of Noise Levels

Various sound levels are used to quantify noise from transit sources, including a sound's loudness, duration, and tonal character. For example, the A-weighted decibel (dBA) is commonly used to describe the overall noise level. Because the decibel is based on a logarithmic scale, a 10-decibel increase in noise level is generally perceived as a doubling of loudness, while a 3-decibel increase in noise is just barely perceptible to the human ear. The A-weighting is an attempt to take into account the human ear's response to audible frequencies. Typical A-weighted sound levels from transit and other common sources are shown in Figure 4.7-1. The following A-weighted noise descriptors are typically used to determine impacts from transit-related sources:

- **Lmax** represents the maximum noise level that occurs during an event or train passby and is the noise level actually heard during the event or passby.
- **Leq** represents a level of constant noise with the same acoustical energy as the fluctuating noise levels (e.g., highway traffic) observed during a given interval, such as one hour. The Leq noise level is commonly used to describe levels at non-residential places (such as offices, schools, and churches) with primarily daytime uses. Leq(h) is a noise level averaged over one hour.
- **Ldn**, the day-night noise level, represents the average noise level evaluated over a 24-hour period. A 10-decibel penalty is added to events that occur during the nighttime hours (10 p.m. to 7 a.m.) to account for people's increased sensitivity to noise while they are sleeping. The Ldn level is commonly used to describe noise levels at residences.
- **SEL** is the sound exposure level typically used to predict overall transit source levels. The SEL converts the time period of the Leq to one second, allowing for the direct comparison of events or passbys with different time durations.

Unlike the Lmax level, the hourly Leq noise level describes noise over a longer time duration than just a single event. For example, a single passby from a six-car Metrorail train at 50 mph has an Lmax of 88 dBA but an Leq(h) level of only 54 dBA. This is due to the concept of time averaging; whereby the overall average noise level (Leq) during the one-hour period is much less than the short-duration passby level of the event (Lmax). The Lmax noise level and the hourly Leq level are theoretically equivalent for constant noise sources such as transformers or rooftop ventilation units.

## 4.7.2 EVALUATION CRITERIA

The criteria used to evaluate noise impacts are described in the following subsections. Criteria used to evaluate operating and construction impacts are discussed separately.

#### 4.7.2.1 Operational Noise

Operational criteria are used to assess noise impacts from the project alternatives when they are fully operational. These criteria are, therefore, typically evaluated against the project operations that occur in the design year.

##### Federal Noise Guidelines

The FTA's *Transit Noise and Vibration Impact Assessment* guidance manual (DOT-95-16, April 1995) presents the basic concepts, methods, and procedures for evaluating the extent and severity of noise impacts from transit projects. Under the FTA guidelines, transit noise impact assessments are based on land use categories and sensitivity to noise from transit sources. As shown in Figure 4.7-2, the FTA noise impact criteria are defined by two curves that allow increasing project noise levels as existing noise increases up to a point, beyond which impact is determined on project noise alone. The FTA Land Use categories and required descriptors are presented in Table 4.7-1.

Additionally, Public Law 97-310 (US Federal Code, Title 16: *Conservation Subchapter XXXV: Wolf Trap Farm Park Section 284a*-j) established a maximum Leq noise limit of 52 to 54 dBA from traffic along the Dulles Toll Road at Wolf Trap Farm Park. Therefore, the provisions of Public Law 97-310 only apply to the BRT 3 Alternative alignment when some BRT routes are proposed along the Dulles Toll Road near Wolf Trap Farm Park.

The FTA noise criteria include two categories: *impact* and *severe impact*. The *impact* threshold defines areas where the change in noise is noticeable but would not be sufficient to cause a strong, adverse community reaction. The *severe impact* threshold defines the noise limits above which a significant percentage of the population would be highly annoyed by new noise. The level of impact at any specific site can be established by comparing the predicted project noise level at the site to the existing noise level at the site. The FTA noise impact criteria for all three land use categories are shown in Figure 4.7-2.

**Table 4.7-1: FTA Land Use Categories and Noise Descriptors**

| Land Use Category | Noise Descriptor | Description |
|---|---|---|
| 1 | Leq(h) | Tracts of land set aside for serenity and quiet, such as outdoor amphitheaters, concert pavilions, and historic landmarks. |
| 2 | Ldn | Buildings used for sleeping such as residences, hospitals, hotels, and other areas where nighttime sensitivity to noise is of utmost importance. |
| 3 | Leq(h) | Institutional land uses with primarily daytime and evening uses including schools, libraries, churches, museums, cemeteries, historic sites, and parks, and certain recreational facilities used for study or meditation. |

Source: Transit Noise and Vibration Impact Assessment - Final Report, Federal Transit Administration, Washington, D.C., April 1995.

##### WMATA Noise Criteria

Potential noise impacts were also evaluated using WMATA noise criteria. While the FTA noise impact criteria are based on cumulative exposure to predict transit noise, the WMATA criteria are based on single-event maximum vehicle passby noise levels. As shown in Table 4.7-2, maximum noise levels (or Lmax) from transit vehicle passbys are applicable to single- and multi-family residences, as well as commercial receptors located in various communities. The WMATA maximum passby noise levels were applied to all modes of transit, including BRT and Metrorail passbys.

**Table 4.7-2: WMATA Criteria for Noise from Single Event Metrorail Operations**

| Community Area Category | | Maximum Airborne Noise Level (Lmax, dBA) | | |
|---|---|---|---|---|
| | | Receptor Category | | |
| | | Single-Family | Multi-Family | Commercial |
| I | Low-density Residential | 70 | 75 | 80 |
| II | Average Residential | 75 | 75 | 80 |
| III | High-density Residential | 75 | 80 | 85 |
| IV | Commercial | 80 | 80 | 85 |
| V | Industrial/Highway | 80 | 85 | 85 |
| **Specific Receptor Categories** | | | | |
| Amphitheaters | | | | 65 |
| "Quiet" Outdoor Recreation Areas | | | | 70 |
| Concert Halls, Radio, and TV Studios | | | | 70 |
| Churches, Theaters, Schools, Hospitals, Museums, and Libraries | | | | 75 |

Source: WMATA Noise and Vibration Design Criteria (2001).

Project noise levels related specifically to facility operations, such as at passenger stations and maintenance facilities, were assessed using the WMATA "Transit Systems Ancillary Facility" criteria. As shown in Table 4.7-3, noise criteria were developed for both transient (short-time-duration) events, such as a train passby, and continuous (long-time-duration) events, such as rooftop ventilation fans. The WMATA criteria were applied to all noise—sensitive locations (receptors) identified along the Dulles Corridor. Randomly occurring noises from service and inspection yards, such as wheel squeal or railcar auxiliary equipment, were also evaluated at nearby residences using the WMATA criteria shown in Table 4.7-4.

**Table 4.7-3: WMATA Criteria for Noise From Transit System Ancillary Facilities**

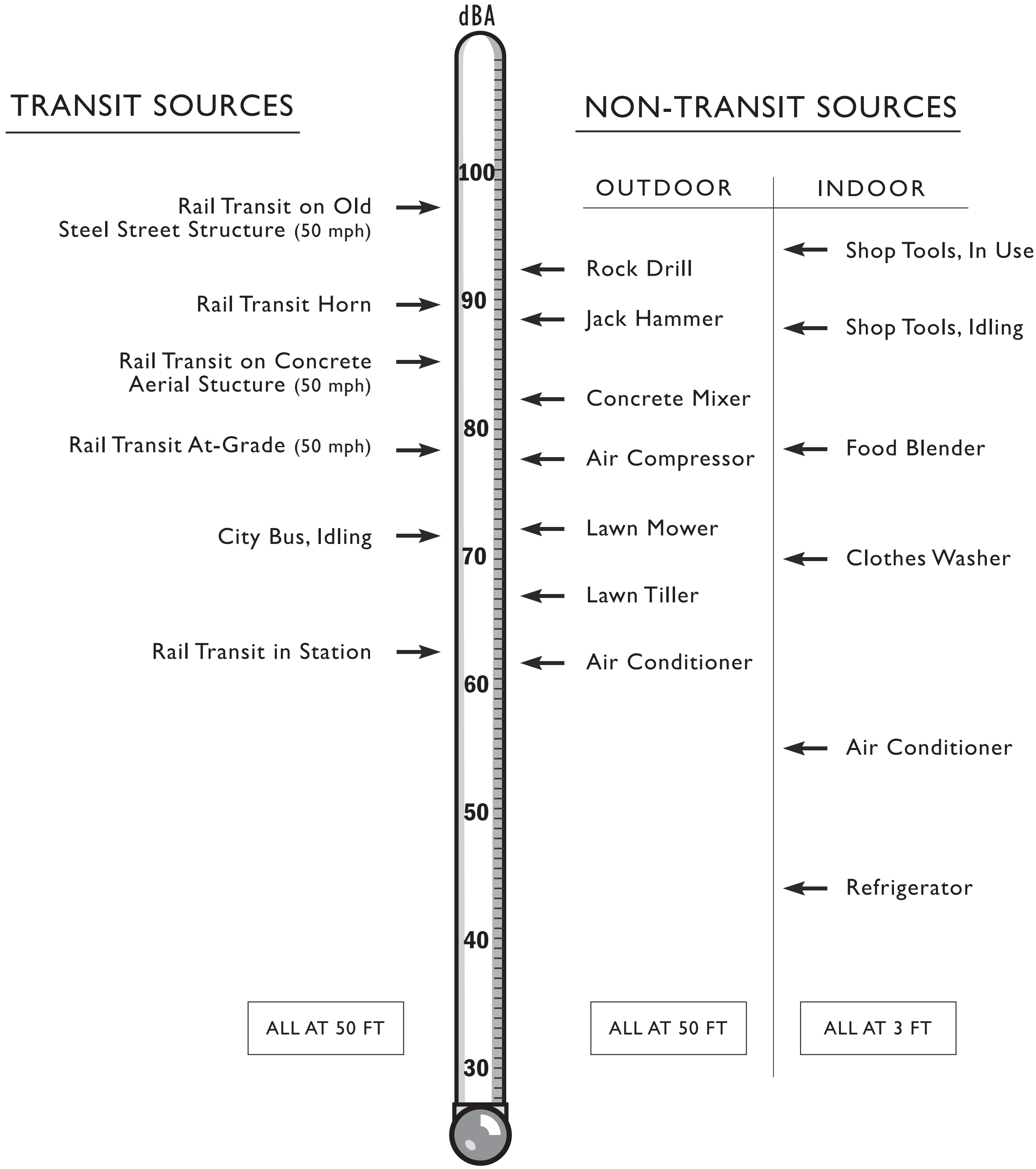
| Community Area Category | | Maximum Noise Level (dBA)[1,2] | | |
|---|---|---|---|---|
| | | Transient Noise | Continuous Noise | |
| | | | Fans, etc. | Transformer |
| I | Low-density Residential | 50 | 40 | 35 |
| II | Average Residential | 55 | 45 | 40 |
| III | High-density Residential | 60 | 50 | 45 |
| IV | Commercial | 65 | 55 | 50 |
| V | Industrial/Highway | 75 | 65 | 60 |

1 The WMATA criteria are generally referenced to or applied at a point 50 feet or farther from the track centerline.
2 Maximum noise levels (or Lmax) are reported for transient and continuous sources.
Source: WMATA Noise and Vibration Design Criteria (2001).

**Table 4.7-4: WMATA Residential Noise Criteria For Metrorail Operations at S&I Yards**

| Community Area Category | | Maximum Noise Level (dBA)[1] |
|---|---|---|
| I | Low-density Residential | 55 |
| II | Average Residential | 55 |
| III | High-density Residential | 65 |
| IV | Commercial | 65 |
| V | Industrial/Highway | 70 |

1 The WMATA criteria are generally applied to the nearest residence or property line.
Source: WMATA Noise and Vibration Design Criteria (2001).
(Thermometer of Typical Noise Levels)

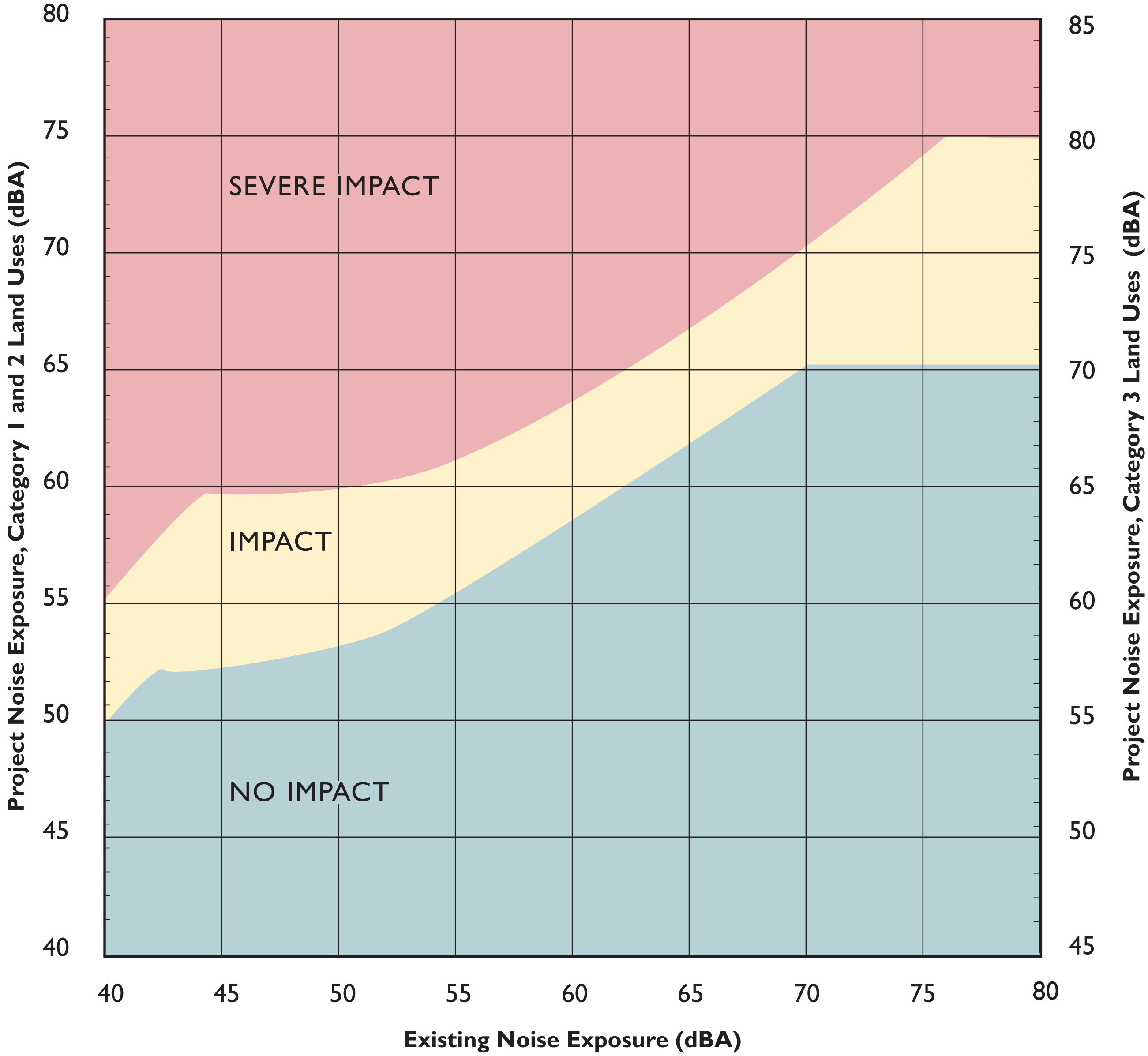



Source: *Transit Noise and Vibration Impact Assessment - Final Report.* Federal Transit Administration, Washington, D.C., April 1995

Figure 4.7-1

**Typical A-Weighted Sound Levels**

Dulles Corridor
Rapid Transit Project




Note: To use this table find the existing noise level along the bottom row and follow the line up to the projected noise level using the scale on the left for Category 1 or 2 Land Uses. At the intersection of the existing and projected levels, the colored background shows *no impact* (blue), *impact* (yellow), or *severe impact* (red).

Noise exposure is in terms of Leq(h) for Category 1 and 3 Land Uses; Ldn for Category 2 Land Uses.

Source: *Transit Noise and Vibration Impact Assessment - Final Report,* Federal Transit Administration, Washington, D.C., April 1995

Figure 4.7-2

## FTA Noise Impact Criteria for Transit Projects

Dulles Corridor
Rapid Transit Project

### VDOT Noise Policy

VDOT's "State Noise Abatement Policy" (January 1, 1997) established evaluation criteria for Type I and II highway projects. As shown in Table 4.7-5, these criteria include both the FHWA Noise Abatement Criteria (NAC) adopted by VDOT and a relative increase over the existing noise level criterion for various land use categories. For the relative increase over existing noise level criterion, a "substantial" increase of 10 dBA or more defines an impacts from highway noise, especially at remote receptors currently not affected by existing traffic. The VDOT noise criteria were applied only to those residences located adjacent to the proposed realignment of the DAAR and Dulles Toll Road, to create space for Metrorail pocket tracks or median transit stations. No other roadway changes affecting either capacity or elevation are expected anywhere else along the Dulles Corridor.

**Table 4.7-5: FHWA and VDOT Noise Abatement Criteria for Highway Projects**

| Agency | Land Use Category | Leq(h) Noise Level (dBA) | Description |
|---|---|---|---|
| FHWA | A | 57 | Lands on which serenity and quiet are of extraordinary significance. |
| | B | 67 | Residences, hotels, schools, churches, libraries, hospitals, parks, and other recreational areas. |
| | C | 72 | Developed lands, properties, or activities not included in Categories A and B above. |
| | D | -- | Undeveloped lands. |
| | E | 52 | Indoor: residences, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums. |
| VDOT | -- | Background+10[1] | Applicable to all noise-sensitive receptors. |

1 Impact threshold limit equals the existing background level plus 10 dBA or more (i.e., "a substantial amount").
Source: VDOT. State Noise Abatement Policy. Richmond, VA. January 1, 1997.

### Local Ordinances

In addition to the FTA, WMATA, and VDOT criteria, an inventory of local and county noise ordinances was compiled for all municipalities along the Dulles Corridor. Local noise ordinances generally set limits on construction and other nuisance noises but not on transit operations. However, local noise ordinances were used to evaluate impacts from stationary sources, such as the proposed Metrorail S&I Yard and the parking garages in Fairfax County. To determine impact, maximum facility noise levels were evaluated against the residential threshold of 55 dBA and a commercial threshold of 60 dBA.

## 4.7.2.2 Construction Noise

Noise limits placed on construction activities by FTA, WMATA, VDOT, and local ordinances are described in the following subsections.

### FTA Guidelines

During the preliminary engineering and environmental analysis phase of a project, construction details are limited; therefore FTA guidelines suggest evaluating proposed construction scenarios against the one-hour Leq noise thresholds shown in Table 4.7-6. These limits are evaluated against noise levels from the two loudest pieces of construction equipment that, under worst case conditions, are assumed to operate continuously for one hour during both the daytime (7 a.m. to 10 p.m.) and nighttime (10 p.m. to 7 a.m.) periods.

**Table 4.7-6: Recommended FTA Construction Noise Limits**

| Land Use Category | Construction Period | |
|---|---|---|
| | Daytime (dBA) | Nighttime(dBA) |
| Residential | 90 | 80 |
| Commercial | 100 | 100 |
| Industrial | 100 | 100 |

Source: Transit Noise and Vibration Impact Assessment - Final Report, Federal Transit Administration, Washington, D.C., April 1995.

### WMATA Noise Criteria

As shown in Table 4.7-7, the WMATA noise criteria for construction activities are applicable to both continuous noise (long-term noise lasting more than 2 hours) and intermittent noise (short-term noise lasting less than 2 hours).

The WMATA noise criteria also set limits on the construction equipment source noise levels as measured at a reference distance of 50 feet. These limits apply separately to various construction equipment types purchased before and after January 1, 1990.

**Table 4.7-7: WMATA Design Criteria Limits for Maximum Noise From Construction Activities**

| Affected Structure or Area | Maximum Allowable Noise Level (dBA) | | | |
|---|---|---|---|---|
| | Continuous | | Intermittent | |
| | Daytime | Nighttime | Daytime | Nighttime |
| **Residential** | | | | |
| Single-family residential areas, not along a major arterial | 60 | 50 | 75 | 60 |
| Multi-family residential areas, along a major arterial, including hospitals | 65 | 55 | 75 | 65 |
| Semi-residential or commercial areas, including hotels | 70 | 60 | 80 | 80 |
| **Commercial** | | | | |
| Semi-residential or commercial areas, including schools | 70 | 65 | 80 | 80 |
| Commercial areas with no nighttime residency | 75 | 70 | 85 | 85 |
| **Industrial** | | | | |
| All locations | 80 | 80 | 90 | 90 |

Note: The WMATA criteria are generally applied to the nearest occupied building or property line.
Source: WMATA Noise and Vibration Design Criteria (2001).

### Local Ordinances

In general, local ordinances along the Dulles Corridor permit construction activities during the daytime hours, from 7 a.m. to 6 p.m. Currently, no identified limits on maximum equipment noise levels are in force in any of the communities along the Dulles Corridor.

## 4.7.3 MODELING METHODOLOGY AND ASSUMPTIONS

The modeling methodologies and the types of noise sources included in the modeled prediction for this project are described in the following subsections. Complete details of the modeling methodologies and data assumptions are discussed in the *Noise and Vibration Technical Report* (June 2002).

#### 4.7.3.1 Operations

Potential transit noise impacts along the Dulles Corridor were evaluated according to the FTA guidelines, which include a screening procedure, general assessment, and detailed analysis, as described below:

- **Screening Procedure** – Identified existing noise-sensitive land uses along the Dulles Corridor and whether an impact is likely. Further analysis is required if noise-sensitive receptors fall within "screening" distances established by the FTA for various transit sources.
- **General Assessment** – Estimated the severity of noise impacts in the study area identified during the Screening Procedure. When existing background noise data are not available, conservative assumptions are used to identify the noise levels at which potential impacts could result.
- **Detailed Analysis** – Quantified impacts through an in-depth analysis that includes ambient noise monitoring and a delineation of site-specific impacts and mitigation measures for each of the proposed project alternatives.

A screening distance of 1,000 feet was used to determine the number, location, and types of noise-sensitive receptors along the Dulles Corridor. The additional 300 feet, added to the FTA screening distance of 700 feet for unobstructed rail transit corridors, accounted for the VDOT limit on Type I highway noise impacts. Because precise alignment and operations data were available, a detailed analysis was conducted to quantify the overall noise level at receptors identified during the screening procedure.

The noise prediction modeling included all new sources of noise proposed in the study area: Metrorail train passbys, wheel squeal along curves, Metrorail auxiliary equipment at stations, public address systems at stations, bus passbys, buses idling at stations and at park-and-ride lots. Operations data were adjusted based on the existing topography, such as acoustically hard or soft ground, terrain cuts, earthen berms, and other noise barrier walls. Project noise levels from facilities operations, such as parking garages, rail yards, and BRT maintenance facilities, were predicted using the FTA General Assessment guidelines. More than 4,100 individual receptor locations were identified through the screening process. These receptor locations include single-family and multi-family residences, hotels, schools, churches, amphitheaters, offices, parks, and historic resources.

#### 4.7.3.2 Construction

Construction noise expected along the Dulles Corridor was estimated according to the procedures outlined in the FTA guidelines. Construction equipment operates as either a stationary or mobile source of noise. Stationary equipment operates in one location for an extended period of time and produces either continuous noise (e.g., from pumps, generators, and compressors) or intermittent noise (e.g., from pile drivers and pavement breakers). Mobile equipment moves around the construction site, with engine power varying as needed (e.g., bulldozers and loaders) or to and from the construction site (e.g., trucks). Construction noise is highly dependent on variations in equipment power setting and activity. Mobile noise sources typically do not continuously operate at full power.

The construction noise prediction methodology was based on the following assumptions:

- Construction equipment operates at full power for a one-hour period;
- Free field conditions are used, ignoring ground effects;
- Equipment's full power is used for the reference emission level;
- All construction equipment operates at the center of the project site or centerline of the rail track;
- The two noisiest pieces of equipment expected to be operating during each construction phase are modeled; and

- Noise attenuation results only from energy dissipation (i.e., 6 dBA for each doubling of distance).

Based on the results of the screening procedure, the general assessment predicted that noise levels would exceed FTA construction noise guidelines, indicating potential construction noise impacts. A detailed construction noise impact assessment will be completed for these locations during the project final design, with mitigation recommendations included in the construction specification documents.

The impact assessment was based on the types of equipment typically used for each construction activity. Noise levels from typical construction equipment types are provided in the FTA guidelines at a reference distance of 50 feet. These levels were used to estimate the onset of impact at nearby sensitive receptors for each of the different construction activities. This assessment will be updated during final design to reflect more precise construction scenarios, equipment types, and operating schedules. The following construction scenarios were selected to be representative of the types of activities expected during construction of the Build Alternatives along the Dulles Corridor:

- Track-Laying (At Grade);
- Track-Laying (Aerial);
- Rail Passenger Station Construction;
- Road and Bridge Construction;
- Feeder Bus Facility Construction;
- Park-and-ride Garage Construction;
- Rail S&I Yard; and
- BRT Maintenance and Storage Facility.

The equipment types and the maximum FTA reference noise levels are shown in Table 4.7-8 for each of the selected construction scenarios. Although numerous equipment types would eventually be used during each scenario, the FTA guidelines suggest using only the two loudest pieces during the preliminary noise impact assessment.

**Table 4.7-8: Maximum Noise Levels for Construction Equipment and Scenarios (dBA)**

| Construction Equipment Type | Construction Scenario | | | | | | |
|---|---|---|---|---|---|---|---|
| | Track Laying (dBA) | | Rail Stations (dBA) | Roads & Bridges (dBA) | Feeder Bus Lots (dBA) | Parking Garage (dBA) | Rail & Bus Yards (dBA) |
| | At Grade | Aerial | | | | | |
| Crane, Derrick | –[1] | 88 | | – | 88 | 88 | – |
| Grader | 85 | – | 85 | 85 | 85 | 85 | – |
| Jackhammer | – | – | – | 88 | – | – | – |
| Loader | – | – | – | – | – | – | 85 |
| Pneumatic Tool | – | – | – | – | – | – | – |
| Tie Inserter | 85 | – | – | – | – | – | – |
| Truck | – | 88 | 88 | – | – | – | 88 |

1 Equipment type not included in the prediction modeling for selected construction scenario.
Source: *Dulles Corridor Rapid Transit Project Noise and Vibration Technical Report*, (June 2002).

### 4.7.4 EXISTING CONDITIONS

The scope and the results of the noise measurement program are described in the following subsections.

#### 4.7.4.1 Background Ambient Noise Levels

In accordance with FTA noise guidelines, a noise-monitoring program was conducted along the Dulles Corridor to (1) establish the existing ambient background levels within the study area and (2) develop project criteria noise limits. These measurements and concurrent traffic counts were used to validate the FHWA noise prediction model for future Build Alternative traffic levels.

Noise measurements were obtained at 30 discrete noise-sensitive receptor locations along the Dulles Corridor. The measurements were taken during the peak travel hours, midday off-peak travel hours, and late at night. The results were used to establish baseline noise levels for both residential and non-residential receptors. The existing noise environment was characterized according to the FTA land use categories shown in Table 4.7-1.

The monitoring locations shown in Figure 4.7-3 were selected to be representative of the types of neighborhoods and land uses found along the corridor. The results of the community noise monitoring program were used to establish the existing background noise levels and to develop the allowable project criteria using the FTA guidelines. The noise monitoring program established existing peak-hour Leq noise levels at non-residential locations and 24-hour Ldn noise levels at residences. The results of the noise monitoring program are summarized in Table 4.7-9.

**Table 4.7-9: Summary of Existing Ambient Noise Levels (dBA)**

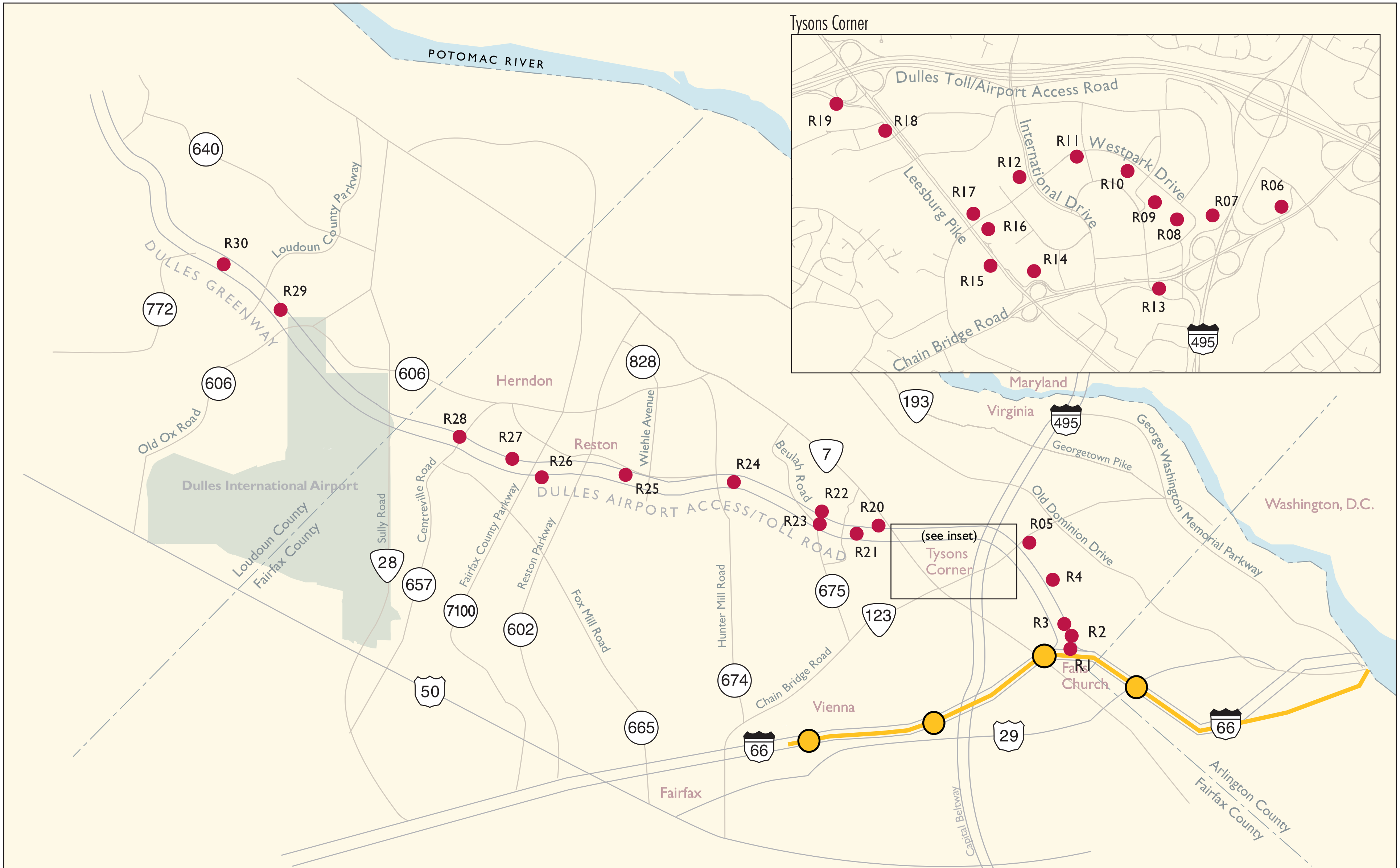
| Receptor | | Area | Type[1] | Land Use Cat.[2] | | Noise Level (dBA)[3] | |
|---|---|---|---|---|---|---|---|
| No. | Description and Location | | | FTA | WMATA | Leq (h) | Ldn |
| **Orange Line Connection** | | | | | | | |
| R1 | The Pavilion (Townhouses), Falls Church Drive | McLean | Res. | 2 | MFAM V | — | 62 |
| R2 | 2134 Greenwich Street | McLean | Res. | 2 | SFAM V | — | 66 |
| R3 | 7103 Norwalk Street | McLean | Res. | 2 | SFAM III | — | 62 |
| R4 | 1726 Baldwin Drive | McLean | Res. | 2 | SFAM III | — | 57 |
| R5 | Hallcrest Heights, 7405 Hallcrest Drive | McLean | Res. | 2 | MFAM V | — | 59 |
| **Tysons Corner** | | | | | | | |
| R6 | Mitre Office Bldg, 7798 Dolley Madison Boulevard | Tysons | NR | 3 | COM IV | 66 | — |
| R7 | Xerox Office Bldg, 7900 Westpark Drive | Tysons | NR | 3 | COM IV | 64 | — |
| R8 | Capital Church, 7903 Westpark Drive | Tysons | NR | 3 | COM IV | 63 | — |
| R9 | IMC Office Bldg, 7925 Westpark Drive | Tysons | NR | 3 | COM IV | 62 | — |
| R10 | MCI Office Bldg, 8003 Westpark Drive | Tysons | NR | 3 | COM IV | 59 | — |
| R11 | Avalon Crescent, 8248 Westpark Drive | Tysons | Res. | 2 | MFAM IV | — | 62 |
| R12 | The Rotonda, Westpark & International Drive | Tysons | Res. | 2 | MFAM IV | — | 62 |
| R13 | La Madeleine Restaurant, 1961 Chain Bridge Road | Tysons | NR | 3 | COM IV | 66 | — |
| R14 | Clyde's Restaurant, 8332 Chain Bridge Road | Tysons | NR | 3 | COM IV | 61 | — |

| Receptor | | Area | Type[1] | Land Use Cat.[2] | | Noise Level (dBA)[3] | |
|---|---|---|---|---|---|---|---|
| No. | Description and Location | | | FTA | WMATA | Leq (h) | Ldn |
| R15 | Cellular One, 8359 Leesburg Pike | Tysons | NR | 3 | COM IV | 66 | – |
| R16 | Best Western Hotel, 8401 Westpark Drive | Tysons | Hotel | 2 | COM IV | – | 63 |
| R17 | Ernst & Young Bldg, 8484 Leesburg Pike | Tysons | NR | 3 | COM IV | 67 | – |
| R18 | Moore Cadillac, 8595 Leesburg Pike | Tysons | NR | 3 | COM IV | 64 | – |
| R19 | Town Homes of Westwood, Leeds Castle Drive | Tysons | Res. | 2 | MFAM V | – | 54 |
| R20 | 1468 Carrington Ridge Lane | Tysons | Res. | 2 | SFAM III | – | 64 |
| **Mid-Corridor** | | | | | | | |
| R21 | Filene Center (Wolf Trap Farm Park) | Vienna | Park | 1 | Park | 54 | – |
| R22 | Cinnamon Creek, 1533 Red Rock Court | Reston | Res. | 2 | SFAM II | – | 54 |
| R23 | 1606 Chathams Ford Drive | Reston | Res. | 2 | SFAM II | – | 63 |
| R24 | Hunter Mill Estates, 1709 Landon Hill Road | Reston | Res. | 2 | SFAM II | – | 57 |
| R25 | Sheraton-Reston Hotel, 11810 Sunrise Valley Drive | Reston | Hotel | 2 | COM V | – | 61 |
| R26 | 12708 Roark Court | Herndon | Res. | 2 | SFAM III | – | 57 |
| R27 | The Crescent at Worldgate, 2204 Westcourt Lane | Herndon | Res. | 2 | MFAM V | – | 69 |
| R28 | 13300 Apgar Place | Herndon | Res. | 2 | MFAM III | – | 61 |
| **Loudoun County** | | | | | | | |
| R29 | Proposed Site of S&I Yard (Y7) | Ashburn | NR | 3 | COM I | 62 | – |
| R30 | 21971 Shellhorn Road | Ashburn | Res. | 2 | SFAM I | – | 57 |

1 Receptor types include residential (Res.), non-residential (NR), and other receptor types (e.g., hotels and parks).
2 The WMATA Land Use categories include single- (SFAM) and multi-family (MFAM) residences, commercial properties (COM), and several other specific Land Use types, such as outdoor amphitheaters (Park). For each receptor type, a corresponding community area category, such as low-density (I) or industrial (V), are also required to select the proper WMATA evaluation criteria.
3 FTA category two locations reported as Ldn levels, FTA category 3 locations reported as Leq(h) levels per FTA guidelines.
Source: *Dulles Corridor Rapid Transit Project Noise and Vibration Technical Report* (June 2002).

Although noise measurements were conducted at only 30 receptor locations, over 4,100 individual noise-sensitive locations were identified throughout the corridor. Individual analysis was conducted for each of the over 4,100 receptors. However, noise levels measured and predicted are only reported for the 30 discrete receptors included in the measurement program. Impacts to other receptors are reported in summary tables in the *Noise and Vibration Technical Report* (June 2002).

Existing peak-hour equivalent noise levels, or Leq(h), at non-residential receptors ranged from 54 dBA at location R21 (Filene Center at Wolf Trap Farm Park) to 67 dBA at location R17 (Ernst and Young office building in Tysons Corner). Similarly, 24-hour noise measurements conducted to establish residential day-night noise levels ranged from 54 dBA at location R22 (Cinnamon Creek neighborhood) to 69 dBA at R27 (The Crescent at Worldgate condominiums). Because receptors located at the airport are typically not noise-sensitive due to the higher ambient background levels, no noise measurements were conducted at Dulles Airport. However, background noise levels for any noise-sensitive receptors identified at MWAA (such as the Dulles Sheraton) were determined based on Ldn noise contours. The measured noise levels were fairly typical for both urban areas and community developments along highway corridors.




LEGEND

- Noise Monitoring Locations
- County Boundary
- Existing Orange Line Metrorail and Stations

0 1 2 3 MILES

Figure 4.7-3

## Community Noise Monitoring Locations along the Dulles Corridor

Dulles Corridor Rapid Transit Project

In general, measured Ldn noise levels were observed below or slightly above 60 dBA at residential communities that benefit from an existing barrier or berm (locations R4, R5, R19, R22, R24, and R28). However, measured Ldn levels well above 60 dBA were observed at residences without any existing mitigation barrier berm (R1, R2, R3, R20, R23, R25, and R27). A detailed description of each of the noise monitoring locations, including figures and sound level meter results, is provided in the *Noise and Vibration Technical Report* (June 2002).

#### 4.7.4.2 Transit Source Levels

In addition to the community noise-monitoring program, measurements were taken to establish noise reference levels from existing sources and were intended to supplement and validate the FTA reference levels through direct comparison with project-specific levels. Both the FTA and the measured noise levels are shown in Table 4.7-10.

**Table 4.7-10: Existing Transit Source Noise Levels (dBA) Observed During the Monitoring Program**

| No. | Event Description | Location | Lmax at 50 feet (dBA) | |
|---|---|---|---|---|
| | | | FTA | Measured |
| 1 | Railcar Passbys | Blue Line Alignment | 80 | 79 |
| 2 | Wheel Squeal, Alignment | National Airport | 100 | 88 |
| 3 | Wheel Squeal, Rail Yard | West Falls Church S&I Yard | 100 | 108 |

Source: *Dulles Corridor Rapid Transit Project Noise and Vibration Technical Report*, (June 2002).

Wayside noise measurements were conducted along a section of straight track near the WMATA Arlington Cemetery Blue Line station. As shown in Table 4.7-10, maximum noise levels from train passbys were measured at 79 dBA. Although the observed level correlates well with the FTA reference level of 80 dBA, the FTA level is preferred as it will yield the more conservative prediction results. The measured Lmax noise levels were normalized for continuously welded rail track to a reference distance of 50 feet at 50 mph so that they could be directly comparable to the FTA levels.

Wheel squeal, or the annoyingly high-pitched, pure tone noise caused by steel wheels rubbing against steel rails, could occur along a track section with a turning radius of less than 1,000 feet depending on the type of railcar wheel truck. Because wheel squeal depends on many factors in addition to track curvature (e.g., humidity, truck design, and speed), it is often difficult to predict its occurrence or estimate its levels without actual measurements. Wheel squeal events from existing Metrorail trains were measured at (1) Ronald Reagan Washington National Airport (National Airport) and (2) the West Falls Church S&I Yard.

Noise measurements were conducted at National Airport to determine wheel squeal noise levels along curves with the WMATA minimum design radius of approximately 755 feet. This radius is proposed at several curve locations in the study area, including Tysons Corner. The measured wheel squeal, with an average normalized Lmax noise level of 88 dBA at 50 feet along a 770-foot curve, is lower than the reference FTA level of 100 dBA rated for all curves.

Similarly, noise measurements were taken at an existing rail yard to determine the wheel squeal level along a much shorter radius curve. The measured noise level along a 300-foot curve at the West Falls Church S&I Yard of 108 dBA was higher than both the WMATA alignment curve (88 dBA) and the FTA reference level (100 dBA). This suggests that the overall wheel squeal noise level varies with the radius of the curve.

Measured wheel squeal noise levels were used in the modeling predictions for both alignment curves and rail yard curves, because it is expected that these measurements are a more accurate predictor of future conditions under the proposed Metrorail and BRT/Metrorail alternatives.

#### 4.7.4.3 Existing Traffic Noise Along the DAAR

As part of the VDOT traffic noise assessment, existing noise measurements were taken during the peak hours along the DAAR and Dulles Toll Road at three locations where future roadway widening is proposed: (1) near Wiehle Avenue, (2) near the existing Herndon-Monroe Park-and-Ride, and (3) just west of Centreville Road near the proposed Route 28 Station. Along with concurrent traffic counts and average vehicle speeds, the noise measurements were used to validate the FHWA traffic noise model (TNM). The validated noise levels were used to assess impact against the FHWA and VDOT "substantial increase over existing" criteria at each of the selected measurement locations. A complete description of the measurement program, including the measurement results, traffic counts, and speeds, is included in the *Noise and Vibration Technical Report* (June 2002).

### 4.7.5 LONG-TERM EFFECTS

A noise assessment was completed to determine the potential noise-related impacts at various sensitive receptor locations along the Dulles Corridor. The noise levels at various receptors for each of the Build Alternatives were predicted using the FTA guidelines and methodologies. These levels were then compared to both the FTA and WMATA criteria. Corridor-wide impacts from operations were then evaluated at noise-sensitive receptors within approximately 1,000 feet of the proposed corridor alignments. The general location of potentially affected noise receptors throughout the corridor is illustrated in Figure 4.7-4.

#### 4.7.5.1 Baseline Alternative

In accordance with FTA guidelines, noise impacts from the future Build Alternatives are not compared to the no-build condition (Baseline Alternative) to determine impacts. Instead, the FTA analysis methodology establishes project criteria noise limits based on existing measured noise levels in the study area. Therefore, FTA guidelines did not require a noise assessment for the Baseline Alternative.

#### 4.7.5.2 BRT Alternative

Predicted noise levels from the BRT Alternative and its three alignment options, are shown in Table 4.7-11.

##### Federal Criteria

As shown in Table 4.7-11, peak-hour Leq noise levels from BRT operations on the Dulles Connector Road, DAAR, Dulles Toll Road, and Dulles Greenway were predicted to range from 37 dBA at R13 (a restaurant in Tysons Corner) under BRT 1 to 53 dBA at R18 (Moore Cadillac on Route 7 in Tysons Corner) under BRT 2 and BRT 3. The peak hour Leq(h) noise levels are not expected to exceed the FTA Land Use Categories 1 and 3 *impact* or *severe impact* criteria at any of the selected discrete receptors.

At residential receptors (Category 2), 24-hour Ldn levels from BRT operations are predicted to range from 37 dBA at R1 (townhouses in the Orange Line Connection) to 59 dBA at a residential receptor (R27) along the DAAR (R27) under BRT 3. As shown in Table 4.7-11, none of the predicted Ldn levels are expected to exceed the FTA Land Use Category 2 *impact* or *severe impact* criteria at the discrete receptor locations.

As shown in Table 4.7-12, corridor-wide project noise levels are predicted to exceed the FTA Category 2 Land Use *impact* criteria at 77 locations under BRT 1, 65 locations under BRT 2, and 81 locations under BRT 3.

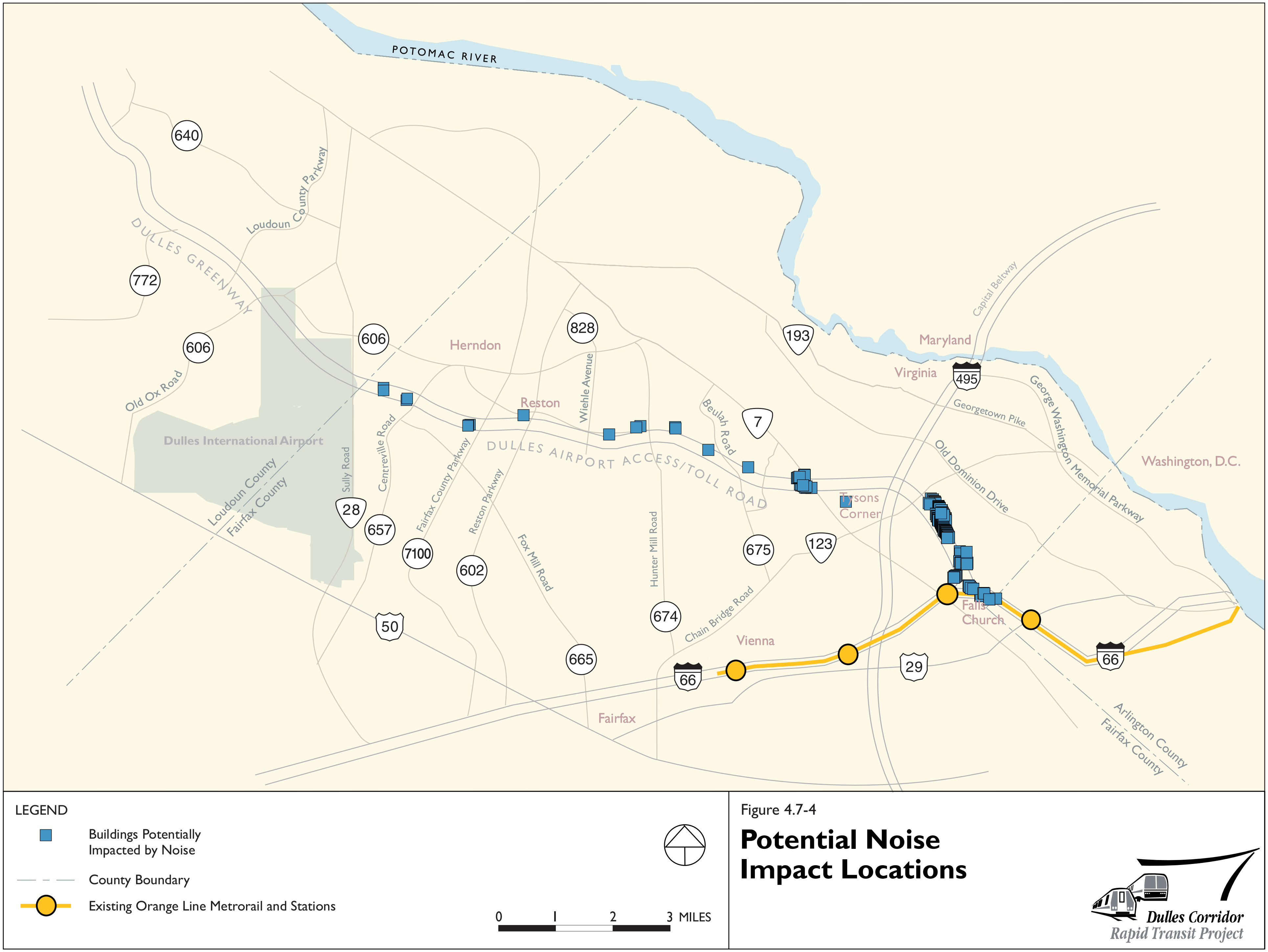



Figure 4.7-4

**Potential Noise Impact Locations**

**Table 4.7-11: FTA Noise Impact Summary from Transit Operations under the BRT Alternative (dBA)**

| Receptor No. | Receptor Description | FTA Land Use Category | Distance To Alignment (feet) | Existing Background Noise Levels (dBA) | BRT Alignment Noise Level (dBA) 1 | 2 | 3 | FTA Impact Criteria (dBA) Impact | Severe Impact |
|---|---|---|---|---|---|---|---|---|---|
| **Orange Line Connection** | | | | | | | | | |
| R1 | The Pavilion, Falls Church Drive | 2 | 1,090 | 62 Ldn | 38 | 37 | 38 | 59 | 64 |
| R2 | 2134 Greenwich Street | 2 | 523 | 66 Ldn | 58 | 58 | 58 | 61 | 67 |
| R3 | 7103 Norwalk Street | 2 | 270 | 62 Ldn | 52 | 51 | 52 | 59 | 64 |
| R4 | 1726 Baldwin Drive | 2 | 283 | 57 Ldn | 46 | 45 | 46 | 56 | 62 |
| R5 | 7405 Hallcrest Drive | 2 | 242 | 59 Ldn | 50 | 49 | 51 | 57 | 63 |
| **Tysons Corner** | | | | | | | | | |
| R6 | 7798 Dolley Madison Boulevard | 3 | 2,122 | 66 Leq | n.a.[1] | n.a. | n.a. | 67 | 72 |
| R7 | 7900 Westpark Drive | 3 | 3,024 | 64 Leq | 41 | 41 | 40 | 65 | 70 |
| R8 | 7903 Westpark Drive | 3 | 3,255 | 63 Leq | 40 | 40 | 40 | 64 | 70 |
| R9 | 7925 Westpark Drive | 3 | 3,044 | 62 Leq | 41 | 41 | 41 | 64 | 70 |
| R10 | 8003 Westpark Drive | 3 | 2,594 | 59 Leq | 42 | 42 | 42 | 62 | 68 |
| R11 | 8248 Westpark Drive | 2 | 1,986 | 62 Ldn | 45 | 44 | 45 | 59 | 65 |
| R12 | The Rotonda | 2 | 2,543 | 62 Ldn | 44 | 43 | 43 | 59 | 65 |
| R13 | 1961 Chain Bridge Road | 3 | 5,054 | 66 Leq | 37 | 37 | 37 | 67 | 72 |
| R14 | 8332 Chain Bridge Road | 3 | 4,715 | 61 Leq | 38 | 38 | 38 | 63 | 69 |
| R15 | 8359 Leesburg Pike | 3 | 4,745 | 66 Leq | 38 | 38 | 38 | 66 | 72 |
| R16 | 8401 Westpark Drive | 2 | 3,747 | 63 Ldn | 41 | 40 | 41 | 60 | 65 |
| R17 | 8484 Leesburg Pike | 3 | 3,431 | 67 Leq | 41 | 41 | 41 | 67 | 73 |
| R18 | 8595 Leesburg Pike | 3 | 1,570 | 64 Leq | 52 | 53 | 53 | 65 | 71 |
| R19 | Westwood Village | 2 | 879 | 54 Ldn | 49 | 50 | 51 | 55 | 61 |
| R20 | 1468 Carrington Ridge Lane | 2 | 331 | 64 Ldn | 49 | 49 | 50 | 60 | 66 |
| **Mid-Corridor** | | | | | | | | | |
| R21 | Filene Center (Wolf Trap Farm Park) | 1 | 492 | 54 Leq | 41 | 41 | 42 | 55 | 61 |
| R22 | 1533 Red Rock Court | 2 | 355 | 54 Ldn | 51 | 51 | 53 | 55 | 61 |
| R23 | 1606 Chathams Ford Drive | 2 | 481 | 63 Ldn | 56 | 57 | 58 | 60 | 65 |
| R24 | 1709 Landon Hill Road | 2 | 308 | 57 Ldn | 46 | 46 | 48 | 56 | 62 |
| R25 | 11810 Sunrise Valley Drive | 2 | 511 | 61 Ldn | 55 | 56 | 57 | 58 | 64 |
| R26 | 12708 Roark Court | 2 | 1,010 | 57 Ldn | 49 | 49 | 49 | 56 | 62 |
| R27 | 2204 Westcourt Lane | 2 | 406 | 69 Ldn | 58 | 57 | 59 | 64 | 69 |
| R28 | 13300 Apgar Place | 2 | 307 | 61 Ldn | 47 | 44 | 46 | 58 | 64 |
| **Loudoun County** | | | | | | | | | |
| R29 | S&I Yard (Y7) | 3 | 573 | 62 Leq | 47 | 48 | 48 | 64 | 69 |
| R30 | 21971 Shellhorn Road | 2 | 1,587 | 57 Ldn | 46 | 44 | 45 | 56 | 62 |

1 Not applicable. Due to other developments along the Dulles Corridor (not associated with the project), several receptors would be "taken."
Source: *Dulles Corridor Rapid Transit Project Noise and Vibration Technical Report*, (June 2002).

**Table 4.7-12: Number of FTA Noise Impacts under the BRT Alternative**

| Corridor Section | FTA Impact Criteria | Alignment | | | | | |
|---|---|---|---|---|---|---|---|
| | | BRT 1 | | BRT 2 | | BRT 3 | |
| | | Category 2 | Category 3 | Category 2 | Category 3 | Category 2 | Category 3 |
| Orange Line Connection | Impact | 47 | 0 | 39 | 0 | 47 | 0 |
| | Severe | 0 | 0 | 0 | 0 | 0 | 0 |
| | Sum | 47 | 0 | 39 | 0 | 47 | 0 |
| Tysons Corridor | Impact | 23 | 0 | 19 | 0 | 26 | 0 |
| | Severe | 0 | 0 | 0 | 0 | 0 | 0 |
| | Sum | 23 | 0 | 19 | 0 | 26 | 0 |
| Mid Corridor | Impact | 5 | 2 | 7 | 0 | 8 | 1 |
| | Severe | 0 | 0 | 0 | 0 | 0 | 0 |
| | Sum | 5 | 2 | 7 | 0 | 8 | 1 |
| Dulles Airport | Impact | 0 | 0 | 0 | 0 | 0 | 0 |
| | Severe | 0 | 0 | 0 | 0 | 0 | 0 |
| | Sum | 0 | 0 | 0 | 0 | 0 | 0 |
| Loudoun County | Impact | 2 | 0 | 0 | 0 | 0 | 0 |
| | Severe | 0 | 0 | 0 | 0 | 0 | 0 |
| | Sum | 2 | 0 | 0 | 0 | 0 | 0 |
| Totals | Impact | 77 | 2 | 65 | 0 | 81 | 1 |
| | Severe | 0 | 0 | 0 | 0 | 0 | 0 |
| | Sum | 77 | 2 | 65 | 0 | 81 | 1 |

FTA Land Use categories include residential (Category 2) and institutional (Category 3) receptors.
Source: *Dulles Corridor Rapid Transit Project Noise and Vibration Technical Report*, (June 2002).

Similarly, exceedances of the FTA Category 3 Land Use *impact* criteria are also predicted at an additional two locations under BRT 1 and one under BRT 3. No exceedances of the FTA Category 1 Land Use criteria are predicted under the BRT Alternative. The corridor-wide impact assessment evaluated impacts at noise-sensitive locations, such as residences, offices, and parks. The number of impacted Category 2 receptors includes buildings and structures such as single- and multi-family dwellings.

### WMATA Criteria

Unlike the FTA criteria, which assess impact based on cumulative noise levels, the WMATA criteria evaluate impacts based on maximum passby noise levels. As shown in Table 4.7-13, Lmax noise levels from bus operations under the BRT Alternative are predicted to range from 50 dBA at townhouses along the Orange Line Connection (R1), to 72 dBA at R27 (townhouses in Reston) under BRT 3. None of the predicted Lmax noise levels at the discrete receptors are expected to exceed the WMATA noise criteria under the BRT Alternative. As shown in Table 4.7-14, single-event Lmax noise levels under the BRT Alternative are predicted to exceed the WMATA design criteria at up to 12 locations under BRT 3 (11 residential and one commercial).

### Project Facilities

Although the overall impact assessment included the noise contribution from project facilities such as passenger stations, feeder bus facilities, and parking garages, their individual contributions were also evaluated against the

WMATA criteria and those from Fairfax County. Lmax noise levels from idling buses at passenger stations

**Table 4.7-13: WMATA Noise Impact Summary at Discrete Receptors under the BRT Alternative**

| Receptor No. | Receptor Description | WMATA Land Use Category | Distance to Alignment (feet) | Alignment (dBA) BRT 1 | BRT 2 | BRT 3 | WMATA Impact Criteria (dBA) |
|---|---|---|---|---|---|---|---|
| **Orange Line Connection** | | | | | | | |
| R1 | Pavilion, Falls Church Drive | MFAM V | 1,090 | 50 | 50 | 50 | 85 |
| R2 | 2134 Greenwich Street | SFAM V | 523 | 66 | 66 | 66 | 80 |
| R3 | 7103 Norwalk Street | SFAM III | 270 | 65 | 65 | 65 | 75 |
| R4 | 1726 Baldwin Drive | SFAM III | 283 | 60 | 60 | 60 | 75 |
| R5 | 7405 Hallcrest Drive | MFAM V | 242 | 63 | 63 | 65 | 85 |
| **Tysons Corner** | | | | | | | |
| R6 | 7798 Dolley Madison Boulevard | COM IV | 2,122 | n.a.[1] | n.a. | n.a. | 85 |
| R7 | 7900 Westpark Drive | COM IV | 3,024 | 55 | 55 | 55 | 85 |
| R8 | 7903 Westpark Drive | COM IV | 3,255 | 55 | 55 | 54 | 85 |
| R9 | 7925 Westpark Drive | COM IV | 3,044 | 55 | 55 | 55 | 85 |
| R10 | 8003 Westpark Drive | COM IV | 2,594 | 56 | 56 | 56 | 85 |
| R11 | 8248 Westpark Drive | MFAM IV | 1,986 | 58 | 58 | 58 | 80 |
| R12 | The Rotonda, International Drive | MFAM IV | 2,543 | 56 | 56 | 56 | 80 |
| R13 | 1961 Chain Bridge Road | COM IV | 5,054 | 51 | 51 | 51 | 85 |
| R14 | 8332 Chain Bridge Road | COM IV | 4,715 | 52 | 52 | 52 | 85 |
| R15 | 8359 Leesburg Pike | COM IV | 4,745 | 52 | 52 | 52 | 85 |
| R16 | 8401 Westpark Drive | COM IV | 3,747 | 54 | 54 | 53 | 85 |
| R17 | 8484 Leesburg Pike | COM IV | 3,431 | 54 | 54 | 54 | 85 |
| R18 | 8595 Leesburg Pike | COM IV | 1,570 | 60 | 60 | 60 | 85 |
| R19 | Westwood Village | MFAM V | 879 | 63 | 63 | 63 | 85 |
| R20 | 1468 Carrington Ridge Lane | SFAM III | 331 | 63 | 63 | 62 | 75 |
| **Mid-Corridor** | | | | | | | |
| R21 | Filene Center (Wolf Trap Farm Park) | Park | 492 | 55 | 55 | 55 | 65 |
| R22 | 1533 Red Rock Court | SFAM II | 355 | 64 | 64 | 65 | 75 |
| R23 | 1606 Chathams Ford Drive | SFAM II | 481 | 70 | 70 | 71 | 75 |
| R24 | 1709 Landon Hill Road | SFAM II | 308 | 59 | 59 | 60 | 75 |
| R25 | 11810 Sunrise Valley Drive | COM V | 511 | 70 | 70 | 70 | 85 |
| R26 | 12708 Roark Court | SFAM III | 1,010 | 60 | 60 | 60 | 75 |
| R27 | 2204 Westcourt Lane | MFAM V | 406 | 71 | 71 | 72 | 80 |
| R28 | 13300 Apgar Place | MFAM III | 307 | 58 | 58 | 59 | 80 |
| **Loudoun County** | | | | | | | |
| R29 | Rail S&I Yard (Y7) | COM V | 573 | 67 | 67 | 67 | 85 |
| R30 | 21971 Shellhorn Road | SFAM I | 1,587 | 60 | 60 | 60 | 70 |

1 Not applicable. Due to other developments along the Dulles Corridor (not associated with the project), several receptors would be "taken."
Source: *Dulles Corridor Rapid Transit Project Noise and Vibration Technical Report* (June 2002).

**Table 4.7-14: Number of WMATA Noise Impacts under the BRT Alternative**

| Corridor Section | Land Use[1] | Alignment | | |
|---|---|---|---|---|
| | | BRT 1 | BRT 2 | BRT 3 |
| Orange Line Connection | Residential | 1 | 1 | 1 |
| | Commercial | 0 | 0 | 0 |
| | Total | 1 | 1 | 1 |
| Tysons Corner | Residential | 3 | 3 | 3 |
| | Commercial | 0 | 0 | 0 |
| | Total | 3 | 3 | 3 |
| Mid Corridor | Residential | 1 | 1 | 3 |
| | Commercial | 1 | 1 | 1 |
| | Total | 2 | 2 | 4 |
| Dulles Airport | Residential | 0 | 0 | 0 |
| | Commercial | 0 | 0 | 0 |
| | Total | 0 | 0 | 0 |
| Loudoun County | Residential | 4 | 4 | 4 |
| | Commercial | 0 | 0 | 0 |
| | Total | 4 | 4 | 4 |
| Totals | Residential | 9 | 9 | 11 |
| | Commercial | 1 | 1 | 1 |
| | Total | 10 | 10 | 12 |

1 Residential (Res.) Land uses include all single- and multi-family buildings while commercial (Com.) receptors include all non-residential receptors such as offices. Other specific receptor types (Other) include schools and amphitheaters.
Source: *Dulles Corridor Rapid Transit Project Noise and Vibration Technical Report* (June 2002).

along the DAAR were predicted to range from 16 dBA at a residence in Reston, to 51 dBA at a residence in Herndon under the BRT Alternative. Similarly, project noise levels from parking facilities were expected to range from below the ambient background at receptors over 2,000 feet away, to 42 dBA at Moore Cadillac in Tysons Corner, which would be less than 750 feet away.

Project noise levels from the BRT Maintenance and Storage Facility, proposed along an area just southeast of Route 606 in Loudoun County at Site 14, would be below the measurable ambient background levels of the closest noise-sensitive receptors. No exceedances of the WMATA facility criteria are predicted under the BRT Alternative.

### Historic Resources

As shown in Table 4.7-15, peak-hour Leq noise levels at the locations of historic resources are expected to range from 37 dBA at H5 (Wolf Trap Farm), to 48 dBA at H3 (Shiloh Baptist Church). Similarly, 24-hour Ldn noise levels are predicted to range from 30 dBA at H13 (Middleton Farm) under BRT 1 to 59 dBA at H10 (Wiehle Historic District) and at H11 (Launders House) under BRT 3. Project noise levels under the BRT Alternative are not predicted to exceed the FTA Land Use Categories 1 or 3 at any historic resources identified in the study area. However, project noise levels are predicted to exceed the Category 2 criteria at residential receptor H10 (due to feeder bus activities under the BRT Alternative), H11 (due to bus passbys along the Dulles Toll Road under BRT 3), and H18 (due to higher bus passby volumes under BRT 1). Mitigation measures will be investigated as part of the feeder bus facility final design.

**Table 4.7-15: FTA Noise Impact Summary from Transit Operations at Historic Resources under the BRT Alternative**

| Receptor No. | Receptor Description | FTA Land Use Category | Distance (feet) | Existing Background Noise Levels | Alignment (dBA) BRT 1[1] | BRT 2[1] | BRT 3[1] | FTA Impact Criteria (dBA) Impact | Severe Impact |
|---|---|---|---|---|---|---|---|---|---|
| H1 | Lewinsville Post Office | 3 | 981 | 57 Leq | 45 | 45 | 45 | 61 | 67 |
| H2 | Bois de Gosses/Windy Hill | 2 | 1,977 | 59 Ldn | 45 | 45 | 46 | 57 | 63 |
| H3 | Shiloh Baptist Church | 3 | 1,294 | 66 Leq | 49 | 48 | 48 | 67 | 72 |
| H4 | Ash Grove | 2 | 447 | 54 Ldn | 41 | 42 | 43 | 55 | 61 |
| H5 | Wolf Trap Farm Park | 3 | 863 | 57 Leq | 37 | 37 | 37 | 61 | 67 |
| H6 | Plantation | 2 | 356 | 54 Ldn | 52 | 53 | 53 | 55 | 61 |
| H7 | Robert Wiehle House | 2 | 1,804 | 61 Ldn | 47 | 47 | 48 | 58 | 64 |
| H8 | Smith Bowman Distillery | 3 | 1,513 | 65 Leq | 47 | 48 | 48 | 66 | 71 |
| H9 | Sunset Hills | 3 | 1,776 | 65 Leq | 57 | 47 | 48 | 66 | 71 |
| H10 | Wiehle/Sunset Hills Historic District | 2 | 1,513 | 61 Ldn | 59 | 59 | 59 | 58 | 64 |
| H11 | Launders House | 2 | 395 | 61 Ldn | 57 | 57 | 59 | 58 | 64 |
| H12 | Ratcliff/Meiselman House | 2 | 1,287 | 61 Ldn | 49 | 49 | 50 | 58 | 64 |
| H13 | Middleton Farm | 2 | 6,833 | 57 Ldn | 30 | 31 | 33 | 56 | 62 |
| H14 | Dulles Airport Terminal | n.a.[2] | n.a.[2] | n.a.[2] | n.a.[2] | n.a.[2] | n.a.[2] | n.a.[2] | n.a.[2] |
| H15 | Cockerille House and Farm | 2 | 1,566 | 57 Ldn | 44 | 44 | 45 | 56 | 62 |
| H16 | House/Farm, Rte. 643 Ryan Road | 2 | 494 | 57 Ldn | 53 | 51 | 52 | 56 | 62 |
| H17 | House, Route. 772 Ryan Road | 2 | 416 | 57 Ldn | 52 | 50 | 51 | 56 | 62 |
| H18 | House, Route. 772 Ryan Road | 2 | 202 | 57 Ldn | 57 | 55 | 56 | 56 | 62 |

Source: *Dulles Corridor Rapid Transit Project Noise and Vibration Technical Report* (June 2002).
1 Assessment of impacts is determined as follows: No Impact; Impact; and Severe Impact.
2 Not applicable. The Dulles Airport Terminal Building is not sensitive to transit noise.

## VDOT Impact Assessment along DAAR and Dulles Toll Road

Under the BRT Alternative both the DAAR and Dulles Toll Road would be realigned to accommodate the proposed Herndon-Monroe and Route 28 stations in the median of the DAAR. As a result, the DAAR and the Dulles Toll Road would be shifted approximately 15 feet closer to the adjacent receptors at these locations (bubble sections). At the Herndon-Monroe Station, the roadway shift is proposed only along the eastbound travel lanes. To determine potential impacts due to this shift, a VDOT (FHWA-type) noise impact assessment was conducted.

As shown in Table 4.7-16, peak-hour Leq traffic noise levels under the BRT Alternative are expected to range from 60 dBA at the Reflection Homes Neighborhood to 71 dBA at the Sequant office building. Reflection Homes and the Homewood Suites Hotel currently benefit from an existing noise barrier, while the Airbus and

the Sequant buildings do not. Because the Sequant office building is less than 100 feet from the Dulles Toll Road, the peak-hour Leq noise level from future traffic under the BRT Alternative is predicted to approach within one decibel of the FHWA Land Use Category C criterion of 72 dBA at the building facade. No other exceedances of the FHWA Land Use Category C criterion are predicted under the BRT Alternative.

**Table 4.7-16: Peak-Hour Noise Impact Summary from Highway Traffic under the BRT Alternative**

| Receptor Description | FHWA Land Use Category | Impact Criteria (dBA) | | Alternative (dBA) | | | |
|---|---|---|---|---|---|---|---|
| | | FHWA | VDOT | Existing | BRT 1 | BRT 2 | BRT 3 |
| Airbus Office Building | C | 72 | 83 | 73 | 69 | 69 | 69 |
| Sequant Office Building, Sunrise Valley Drive | C | 72 | 77 | 67 | 71 | 71 | 71 |
| Reflection Homes | B | 67 | 65 | 55 | 60 | 60 | 60 |
| Homewood Suites Hotel | B | 67 | 67 | 57 | 61 | 61 | 61 |

Source: *Dulles Corridor Rapid Transit Project Noise and Vibration Technical Report* (June 2002).

No exceedances of the FHWA Land Use Category B (residences) are predicted at any other nearby locations under the BRT Alternative. Additionally, no exceedances of the VDOT "substantial increase over existing" criterion are predicted under the BRT Alternative.

### 4.7.5.3 Metrorail Alternative

The Metrorail Alternative would extend Metrorail service from the Orange Line and Routes 7 and 123 to Loudoun County. Under this alternative, four rail alignments were evaluated in Tysons Corner, including three along Routes 7 and 123 (T1, T6, T9, and T9 Design Option) and one alignment the diverges into two single-track legs, one along Westpark Drive and one along Routes 7 and 123 (T4). The T9 Design Option, a variation of the Alignment T9 with a modified tunnel configuration at the Route 7 interchange, was also evaluated in Tysons Corner. The effectiveness of the shielding currently provided by the existing berms and barrier walls along the DAAR and Dulles Connector Road would be diminished in those areas where elevated Metrorail tracks are proposed. Overall noise levels are also expected to increase at receptors located near rail curves with radii less than 1,000 feet due to the onset of wheel squeal. To minimize these new noise sources, 3-foot metro barriers or parapets would be included in the overall design along the aerial sections of track.

#### Federal Criteria

Under the Metrorail Alternative, peak-hour Leq noise levels, as shown in Table 4.7-17, are predicted to range from 29 dBA at R14 (Clyde's Restaurant) along an underground section of track (Alignment T6) to 58 dBA at R17 (Ernst and Young office building) in Tysons Corner. The peak hour Leq(h) noise levels are not expected to exceed the FTA Land Use Categories 1 and 3 *impact* or *severe impact* criteria at any of the selected discrete receptors.

At residential receptors (Category 2), 24-hour Ldn levels from Metrorail operations are predicted to range from 30 dBA at R11 (Avalon Crescent Townhouses) under Alignment T6 to 60 dBA at R20 (a residence along the DAAR) in Tysons Corner. As shown in Table 4.7-17, only one exceedance of the FTA Land Use Category 2 *impact* criteria is predicted from Metrorail passbys at location R19 (Westwood Village) adjacent to the rail curve at Route 7 and the DAAR. However, none of the predicted Ldn levels are expected to exceed the FTA Land Use Category 2 *Severe Impact* criteria at any of these receptors.

**Table 4.7-17: FTA Noise Impact Summary at Discrete Receptors Under the Metrorail Alternative (dBA)**

| Receptor | | FTA Category | Distance To Alignment | Existing Background | Alignment Noise Level (dBA) | | | | FTA Impact Criteria (dBA) | |
|---|---|---|---|---|---|---|---|---|---|---|
| No. | Description | | | | T1[1] | T6[1] | T9[1] | T4[1] | Impact | Severe Impact |
| **Orange Line Connection** | | | | | | | | | | |
| R1 | Pavilion, Falls Church Drive | 2 | 474 | 62 Ldn | 48 | 48 | 48 | 48 | 59 | 64 |
| R2 | 2134 Greenwich Street | 2 | 327 | 66 Ldn | 56 | 56 | 56 | 56 | 61 | 67 |
| R3 | 7103 Norwalk Street | 2 | 239 | 62 Ldn | 57 | 57 | 57 | 57 | 59 | 64 |
| R4 | 1726 Baldwin Drive | 2 | 283 | 57 Ldn | 48 | 48 | 48 | 48 | 56 | 62 |
| R5 | 7405 Hallcrest Drive | 2 | 241 | 59 Ldn | 53 | 53 | 57 | 52 | 57 | 63 |
| **Tysons Corner** | | | | | | | | | | |
| R6 | 7798 Dolley Madison Boulevard | 3 | 90 | 66 Leq | n.a.[2] | n.a.[2] | n.a.[2] | n.a.[2] | 67 | 72 |
| R7 | 7900 Westpark Drive | 3 | 207 | 64 Leq | 56 | 56 | 56 | 53 | 65 | 70 |
| R8 | 7903 Westpark Drive | 3 | 169 | 63 Leq | 56 | 55 | 55 | 52 | 64 | 70 |
| R9 | 7925 Westpark Drive | 3 | 168 | 62 Leq | 55 | 55 | 54 | 50 | 64 | 70 |
| R10 | 8003 Westpark Drive | 3 | 194 | 59 Leq | 44 | 44 | 44 | 50 | 62 | 68 |
| R11 | 8248 Westpark Drive | 2 | 187 | 62 Ldn | 30 | 30 | 32 | 54 | 59 | 65 |
| R12 | The Rotonda, International Drive | 2 | 176 | 62 Ldn | 53 | 32 | 51 | 50 | 59 | 65 |
| R13 | 1961 Chain Bridge Road | 3 | 263 | 66 Leq | 56 | 56 | 56 | 51 | 67 | 72 |
| R14 | 8332 Chain Bridge Road | 3 | 466 | 61 Leq | 33 | 29 | 55 | 51 | 63 | 69 |
| R15 | 8359 Leesburg Pike | 3 | 148 | 66 Leq | 32 | 30 | 52 | 50 | 66 | 72 |
| R16 | 8401 Westpark Drive | 2 | 294 | 63 Ldn | 57 | 31 | 54 | 51 | 60 | 65 |
| R17 | 8484 Leesburg Pike | 3 | 118 | 67 Leq | 58 | 35 | 55 | 58 | 67 | 73 |
| R18 | 8595 Leesburg Pike | 3 | 192 | 64 Leq | 56 | 56 | 55 | 55 | 65 | 71 |
| R19 | Westwood Village | 2 | 697 | 54 Ldn | 57 | 56 | 54 | 56 | 55 | 61 |
| R20 | 1468 Carrington Ridge Lane | 2 | 331 | 64 Ldn | 60 | 60 | 58 | 60 | 60 | 66 |
| **Mid-Corridor** | | | | | | | | | | |
| R21 | Filene Center (Wolf Trap Farm Park) | 1 | 492 | 54 Leq | 42 | 42 | 42 | 42 | 55 | 61 |
| R22 | 1533 Red Rock Court | 2 | 355 | 54 Ldn | 49 | 49 | 49 | 49 | 55 | 61 |
| R23 | 1606 Chathams Ford Drive | 2 | 481 | 63 Ldn | 58 | 58 | 58 | 58 | 60 | 65 |
| R24 | 1709 Landon Hill Road | 2 | 308 | 57 Ldn | 46 | 46 | 46 | 46 | 56 | 62 |
| R25 | 11810 Sunrise Valley | 2 | 511 | 61 Ldn | 56 | 56 | 56 | 56 | 58 | 64 |
| R26 | 12708 Roark Court | 2 | 1,010 | 57 Ldn | 49 | 49 | 49 | 49 | 56 | 62 |
| R27 | 2204 Westcourt Lane | 2 | 406 | 69 Ldn | 59 | 59 | 59 | 59 | 64 | 69 |

| Receptor | | FTA Category | Distance To Alignment | Existing Background | Alignment Noise Level (dBA) | | | | FTA Impact Criteria (dBA) | |
|---|---|---|---|---|---|---|---|---|---|---|
| **No.** | **Description** | | | | **T1[1]** | **T6[1]** | **T9[1]** | **T4[1]** | **Impact** | **Severe Impact** |
| R28 | 13300 Apgar Place | 2 | 307 | 61 Ldn | 45 | 45 | 45 | 45 | 58 | 64 |
| **Loudoun County** | | | | | | | | | | |
| R29 | Rail S&I Yard (Y7) | 3 | 573 | 62 Leq | 54 | 54 | 54 | 54 | 64 | 69 |
| R30 | 21971 Shellhorn Road | 2 | 1,587 | 57 Ldn | 45 | 45 | 45 | 45 | 56 | 62 |

1 Assessment of impacts is determined as follows: No impact, Impact, Severe Impact.
2 Not applicable. Due to other developments along the Dulles Corridor (not associated with the project), several receptors would be "taken."
Source: *Dulles Corridor Rapid Transit Project Noise and Vibration Technical Report* (June 2002).

As shown in Table 4.7-18, corridor-wide project noise levels are predicted to exceed the FTA Category 2 Land Use i*mpact* criteria at 117 locations under Alignment T1, 116 locations under Alignment T6, 109 locations under Alignment T9, and 118 locations under Alignment T4. The Category 2 *severe impact* criteria is exceeded at three locations for all alignment options. Project noise levels are predicted to exceed Category 3 *Impact* criteria at two locations for all alignment options. Due to their similarities, the T9 Design Option and Alignment T9 would have equivalent noise impacts corridor wide.

**Table 4.7-18: Number of FTA Noise Impacts under the Metrorail Alternative**

| Corridor Section | Impact Criteria | Impacts by Alignment | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | **T1** | | **T6** | | **T9** | | **T4** | |
| | | **Category 2** | **Category 3** | **Category 2** | **Category 3** | **Category 2** | **Category 3** | **Category 2** | **Category 3** |
| Orange Line Connection | Impact | 79 | 0 | 79 | 0 | 79 | 0 | 79 | 0 |
| | Severe Impact | 3 | 0 | 3 | 0 | 3 | 0 | 3 | 0 |
| | Sum | 82 | 0 | 82 | 0 | 82 | 0 | 82 | 0 |
| Tysons Corridor | Impact | 36 | 0 | 35 | 0 | 28 | 0 | 33 | 0 |
| | Severe Impact | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Sum | 36 | 0 | 35 | 0 | 28 | 0 | 33 | 0 |
| Mid Corridor | Impact | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | Severe Impact | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Sum | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Dulles Airport | Impact | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Severe Impact | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Sum | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Loudoun County | Impact | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Severe Impact | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Sum | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | Impact | 117 | 2 | 116 | 2 | 109 | 2 | 114 | 2 |

| Corridor Section | Impact Criteria | Impacts by Alignment | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | T1 | | T6 | | T9 | | T4 | |
| | | Category 2 | Category 3 | Category 2 | Category 3 | Category 2 | Category 3 | Category 2 | Category 3 |
| | Severe Impact | 3 | 0 | 3 | 0 | 3 | 0 | 3 | 0 |
| | Sum | 120 | 2 | 119 | 2 | 112 | 2 | 117 | 2 |

Source: *Dulles Corridor Rapid Transit Project Noise and Vibration Technical Report*, (June 2002).

### WMATA Criteria

Lmax noise levels from train passbys and stationary events, such as public address announcements at the stations, would range from less than the ambient background at receptors located near underground sections of track in Tysons Corner, to 73 dBA at R17 (Ernst and Young office building) from train passbys as shown in Table 4.7-19. No exceedances of the WMATA noise criteria are predicted under the Metrorail Alternative at any of the selected discrete receptors.

**Table 4.7-19: WMATA Noise Impact Summary at Discrete Receptors under the Metrorail Alternative**

| Receptor | | WMATA Category | Distance To Alignment (feet) | Alternative Noise Level (dBA) | | | | Impact Criteria (dBA) |
|---|---|---|---|---|---|---|---|---|
| No. | Description | | | T1[1] | T6[1] | T9[1] | T4[1] | |
| **Orange Line Connection** | | | | | | | | |
| R1 | Pavilion, Falls Church Drive | MFAM V | 474 | 58 | 58 | 58 | 58 | 85 |
| R2 | 2134 Greenwich Street | SFAM V | 327 | 68 | 68 | 68 | 68 | 80 |
| R3 | 7103 Norwalk Street | SFAM III | 239 | 70 | 70 | 70 | 70 | 75 |
| R4 | 1726 Baldwin Drive | SFAM III | 283 | 62 | 62 | 62 | 62 | 75 |
| R5 | 7405 Hallcrest Drive | MFAM V | 241 | 67 | 67 | 70 | 66 | 85 |
| **Tysons Corner** | | | | | | | | |
| R6 | 7798 Dolley Madison Boulevard | COM IV | 90 | n.a.[2] | n.a.[2] | n.a.[2] | n.a.[2] | 85 |
| R7 | 7900 Westpark Drive | COM IV | 207 | 70 | 70 | 70 | 68 | 85 |
| R8 | 7903 Westpark Drive | COM IV | 169 | 69 | 69 | 69 | 67 | 85 |
| R9 | 7925 Westpark Drive | COM IV | 168 | 69 | 68 | 68 | 64 | 85 |
| R10 | 8003 Westpark Drive | COM IV | 194 | 58 | 58 | 58 | 64 | 85 |
| R11 | 8248 Westpark Drive | MFAM IV | 187 | 32 | 32 | 37 | 68 | 80 |
| R12 | The Rotonda, Int'l Drive | MFAM IV | 176 | 67 | BD[3] | 65 | 60 | 80 |
| R13 | 1961 Chain Bridge Road | COM IV | 263 | 69 | 69 | 69 | 64 | 85 |
| R14 | 8332 Chain Bridge Road | COM IV | 466 | 39 | BD[3] | 68 | 66 | 85 |
| R15 | 8359 Leesburg Pike | COM IV | 148 | 35 | BD[3] | 66 | 64 | 85 |
| R16 | 8401 Westpark Drive | COM IV | 294 | 71 | BD[3] | 68 | 64 | 85 |
| R17 | 8484 Leesburg Pike | COM IV | 118 | 73 | BD[3] | 70 | 67 | 85 |
| R18 | 8595 Leesburg Pike | COM IV | 192 | 69 | 68 | 67 | 67 | 85 |
| R19 | Westwood Village | MFAM V | 697 | 70 | 70 | 67 | 70 | 85 |
| R20 | 1468 Carrington Ridge Lane | SFAM III | 331 | 73 | 73 | 71 | 73 | 75 |
| **Mid-Corridor** | | | | | | | | |
| R21 | Filene Center (Wolf Trap Farm Park) | Park | 492 | 57 | 57 | 57 | 57 | 65 |
| R22 | 1533 Red Rock Court | SFAM II | 354 | 63 | 63 | 63 | 63 | 75 |
| R23 | 1606 Chathams Ford Drive | SFAM II | 482 | 72 | 72 | 72 | 72 | 75 |

| Receptor No. | Receptor Description | WMATA Category | Distance To Alignment (feet) | Alternative Noise Level (dBA) T1[1] | T6[1] | T9[1] | T4[1] | Impact Criteria (dBA) |
|---|---|---|---|---|---|---|---|---|
| R24 | 1709 Landon Hill Road | SFAM II | 307 | 60 | 60 | 60 | 60 | 75 |
| R25 | 11810 Sunrise Valley | COM V | 511 | 71 | 71 | 71 | 71 | 85 |
| R26 | 12708 Roark Court | SFAM III | 1,010 | 60 | 60 | 60 | 60 | 75 |
| R27 | 2204 Westcourt Lane | MFAM V | 406 | 72 | 72 | 72 | 72 | 80 |
| R28 | 13300 Apgar Place | MFAM III | 307 | 56 | 56 | 56 | 56 | 80 |
| **Loudoun County** | | | | | | | | |
| R29 | Rail S&I Yard (Y7) | COM V | 573 | 68 | 68 | 68 | 68 | 85 |
| R30 | 21971 Shellhorn Road | SFAM I | 1,587 | 57 | 57 | 57 | 57 | 70 |

1 Assessment of impact is determined as follows: No impact and **impact**
2 Not applicable. Due to other developments along the Dulles Corridor (not associated with the project), several receptors would be "taken".
3 Below detection. Project levels at receptors near underground sections of track would be well below the ambient background level.
Source: *Dulles Corridor Rapid Transit Project Noise and Vibration Technical Report* (June 2002).

Single-event Lmax noise levels under the Metrorail Alternative are predicted to exceed the WMATA noise criteria at 17 locations under Alignments T1 and T6 (15 residential and 2 commercial) and 16 locations under Alignments T9 and T4 (14 residential and 2 commercial) as shown in Table 4.7-20. The locations of the predicted noise impacts are shown in Figure 4.7-4. Due to similarities between Alignment T9 and T9 Design Option, the corridor wide noise impacts were identical.

**Table 4.7-20: Number of WMATA Noise Impacts under the Metrorail Alternative**

| Corridor Section | Land Use[1] | Impacts by Alignment T1 | T6 | T9 | T4 |
|---|---|---|---|---|---|
| Orange Line Connection | Residential | 11 | 11 | 11 | 11 |
| | Commercial | 1 | 1 | 1 | 1 |
| | Other | 12 | 12 | 12 | 12 |
| Tysons Corner | Residential | 1 | 1 | 0 | 0 |
| | Commercial | 0 | 0 | 0 | 0 |
| | Other | 1 | 1 | 0 | 0 |
| Mid Corridor | Residential | 3 | 3 | 3 | 3 |
| | Commercial | 1 | 1 | 1 | 1 |
| | Other | 4 | 4 | 4 | 4 |
| Dulles Airport | Residential | 0 | 0 | 0 | 0 |
| | Commercial | 0 | 0 | 0 | 0 |
| | Other | 0 | 0 | 0 | 0 |
| Loudoun County | Residential | 0 | 0 | 0 | 0 |
| | Commercial | 0 | 0 | 0 | 0 |
| | Other | 0 | 0 | 0 | 0 |
| Totals | Residential | 15 | 15 | 14 | 14 |
| | Commercial | 2 | 2 | 2 | 2 |
| | Other | 0 | 0 | 0 | 0 |

1 Residential (Res.) land uses include all single- and multi-family buildings while commercial (Com.) receptors include all non-residential receptors such as offices. Other specific receptor types (Other) include schools and amphitheaters.
Source: *Dulles Corridor Rapid Transit Project Noise and Vibration Technical Report* (June 2002).

### Project Facilities

Overall noise levels from proposed facilities, including idling buses at ancillary feeder bus facilities, Metrorail auxiliary equipment, or PA system announcements, are predicted to be the same as under the BRT Alternative. However, wheel squeal from a 300-foot radius curve along a new rail yard lead at the West Falls Church S&I Yard is predicted to exceed the WMATA noise criteria at 24 residences in McLean. No other exceedances of the WMATA facility criteria are predicted under the Metrorail Alternative. Stationary facility noise levels, however, are predicted to exceed the Fairfax County impact criteria at up to 263 residences under Alignment T4 (260 impacts as a result of the West Falls Church S&I Yard wheel squeal and three impacts due to proposed stations and feeder bus stops) and up to seven commercial receptors under Alignment T9 and T9 Design Option.. Projected noise levels from the alternative S&I Yard sites in Loudoun County (Sites 7, 15, and 20) also are not predicted to exceed any of the selected criteria.

### Historic Resources

As shown in Table 4.7-21, peak-hour Leq noise levels are expected to range from 37 dBA at H5 (Wolf Trap Farm Park) to 48 dBA at H8 (Smith Bowman Distillery), and H9 (Sunset Hills). Similarly, 24-hour Ldn noise levels are predicted to range from 23 dBA at H13 (Middleton Farm) to 58 dBA at H11 (Launders House). Except for H4 (Ash Grove), none of the project noise levels under the Metrorail Alternative are predicted to exceed the FTA Land Use Categories 1, 2, or 3 criteria at historic resources in the study area. However, exceedances of the FTA Land Use Category 2 impact criteria are predicted at H4 (Ash Grove) under Alignments T1 and T6 (due to wheel squeal). Mitigation measures would be available to eliminate these impacts.

**Table 4.7-21: FTA Noise Impact Summary at Historic Resources under the Metrorail Alternative**

| Receptor | | FTA Land Use Category | Distance | Existing Background | Alignment Noise Levels (dBA) | | | | FTA Impact Criteria | |
|---|---|---|---|---|---|---|---|---|---|---|
| **No.** | **Description** | | | | **T1**[1] | **T6**[1] | **T9**[1] | **T4**[1] | **Impact** | **Severe Impact** |
| H1 | Lewinsville Post Office | 3 | 975 | 57 Leq | 43 | 43 | 45 | 43 | 61 | 67 |
| H2 | Bois de Gosses/Windy Hill | 2 | 2,601 | 59 Ldn | 43 | 43 | 47 | 43 | 57 | 63 |
| H3 | Shiloh Baptist Church | 3 | 4,303 | 66 Leq | 46 | 46 | 45 | 46 | 67 | 72 |
| H4 | Ash Grove Historic Site | 2 | 514 | 54 Ldn | 56 | 56 | 57 | 55 | 55 | 61 |
| H5 | Wolf Trap Farm Park | 3 | 898 | 57 Leq | 37 | 37 | 37 | 37 | 61 | 67 |
| H6 | Plantation | 2 | 397 | 54 Ldn | 52 | 52 | 52 | 52 | 55 | 61 |
| H7 | Robert Wiehle House | 2 | 1,841 | 61 Ldn | 48 | 48 | 48 | 48 | 58 | 64 |
| H8 | Smith Bowman Distillery | 3 | 1,547 | 65 Leq | 48 | 48 | 48 | 48 | 66 | 71 |
| H9 | Sunset Hills | 3 | 1,808 | 65 Leq | 48 | 48 | 48 | 48 | 66 | 71 |
| H10 | Wiehle/Sunset Hills Historic District | 2 | 1,547 | 61 Ldn | 56 | 56 | 56 | 56 | 58 | 64 |
| H11 | Launders House | 2 | 395 | 61 Ldn | 58 | 58 | 58 | 58 | 58 | 64 |
| H12 | Ratcliff/Meiselman House | 2 | 1,326 | 61 Ldn | 50 | 50 | 50 | 50 | 58 | 64 |
| H13 | Middleton Farm | 2 | 6,594 | 57 Ldn | 23 | 23 | 23 | 23 | 56 | 62 |
| H14 | Dulles Airport | n.a.[2] | n.a.[2] | n.a.[2] | n.a.[2] | n.a.[2] | n.a.[2] | n.a.[2] | n.a.[2] | n.a.[2] |
| H15 | Cockerille House and Farm | 2 | 1,969 | 57 Ldn | 41 | 41 | 41 | 41 | 56 | 62 |
| H16 | House/Farm, Rte. 643 Ryan Road | 2 | 598 | 57 Ldn | 56 | 56 | 56 | 56 | 56 | 62 |
| H17 | House, Route. 772 Ryan Road | 2 | 467 | 57 Ldn | 53 | 53 | 53 | 53 | 56 | 62 |
| H18 | House, Route. 772 Ryan Road | 2 | 588 | 57 Ldn | 51 | 51 | 51 | 51 | 56 | 62 |

1: Assessment of impact is determined as follows: No impact, impact, and (Severe Impact).
2: Not applicable. The Dulles Airport Terminal Building is not sensitive to transit noise.
Source: *Dulles Corridor Rapid Transit Project Noise and Vibration Technical Report* (June 2002).

### VDOT Impact Assessment Along DAAR and Dulles Toll Road

Under the Metrorail Alternative, most bus service would be eliminated along the Dulles Corridor. As a result, the peak-hour traffic noise levels are predicted to decrease slightly. As shown in Table 4.7-22, peak-hour Leq traffic noise levels under the Metrorail Alternative are expected to range from 56 dBA at the Reflection Homes, to 71 dBA at the office buildings along the Mid-Corridor. As a result, due to the proximity of hotels and other commercial receptors to the DAAR, peak-hour Leq noise levels from future traffic under the Metrorail Alternative are predicted to approach or exceed the FHWA Land Use Category B criterion of 67 dBA at one hotel near the Herndon-Monroe widening. Similarly, peak-hour Leq noise levels are expected to approach or exceed the FHWA Land Use Category C criterion of 72 dBA at seven receptors (three near Wiehle Avenue and four near Herndon-Monroe). However, no exceedances of the VDOT "substantial increase over existing" criterion are predicted under the Metrorail Alternative.

**Table 4.7-22: Peak-Hour Noise Impact Summary at Bubble Sections under the Metrorail Alternative**

| Receptor Description | FHWA Land Use Category | Impact Criteria (dBA) | | Alternative Noise Levels (dBA) | |
|---|---|---|---|---|---|
| | | FHWA | VDOT | Existing | Metrorail |
| Concert Building, Centennial Park Drive (Wiehle Avenue) | C | 72 | 83 | 68 | 67 |
| Kaiser Permenente Building (Wiehle Avenue) | C | 72 | 83 | 68 | 71 |
| Airbus Office Building | C | 72 | 83 | 73 | 70 |
| Sequant Office Building, Sunrise Valley Drive | C | 72 | 77 | 67 | 70 |
| Reflection Homes | B | 67 | 65 | 55 | 56 |
| Homewood Suites Hotel | B | 67 | 67 | 57 | 58 |

Source: *Dulles Corridor Rapid Transit Project Noise and Vibration Technical Report* (June 2002).

### 4.7.5.4 BRT/Metrorail Alternative

The BRT/Metrorail Alternative would include Metrorail service from the West Falls Church to the Tysons West Station with connecting BRT service to Dulles Airport and Loudoun County. Under this alternative, four rail alignments were evaluated in Tysons Corner, including three along Routes 7 and 123 (T1, T6, T9, and T9 Design Option) and one alignment that diverges into two single-track legs, one along Westpark Drive and one along Routes 7 and 123 (T4). For the purposes of this analysis, BRT service west of Tysons Corner is assumed to include the alignment and operations of BRT 1. As with the Metrorail Alternative, the T9 Design Option was also evaluated in Tysons Corner under the BRT/Metrorail Alternative.

### Federal Criteria

As shown in Table 4.7-23, peak-hour Leq noise levels are predicted to range from 29 dBA at R14 (Clyde's Restaurant) along an underground section of track (Alignment T6), to 58 dBA at R17 (Ernst and Young office building) in Tysons Corner. The peak hour Leq(h) noise levels are not expected to exceed the FTA Land Use Categories 1 and 3 *Impact* or *Severe Impact* criteria at any of the selected discrete receptors.

At residential receptors (Category 2), 24-hour Ldn levels from BRT and Metrorail operations are predicted to range from 30 dBA at R11 (Avalon Crescent Townhouses), to 58 dBA at R27 (condominiums in Herndon). As shown in Table 4.7-23, only one exceedance of the FTA Land Use Category 2 *impact* criteria is predicted, due primarily to Metrorail passbys at location R19 (Westwood Village). However, none of the predicted Ldn levels are expected to exceed the FTA Land Use Category 2 *severe impact* criteria at any of the discrete receptors.

**Table 4.7-23: FTA Noise Impact Summary at Discrete Receptors from Transit Operations under the BRT/Metrorail Alternative**

| Receptor | | FTA Land Use Category | Distance to Alignment (feet) | Existing Background Noise Levels | Alignment Noise Level (dBA) | | | | FTA Impact Criteria (dBA) | |
|---|---|---|---|---|---|---|---|---|---|---|
| No. | Description | | | | T1[1] | T6[1] | T9[1] | T4[1] | Impact | Severe Impact |
| **Orange Line Connection** | | | | | | | | | | |
| R1 | Pavilion, Falls Church Drive | 2 | 474 | 62 Ldn | 48 | 48 | 48 | 48 | 59 | 64 |
| R2 | 2134 Greenwich Street | 2 | 327 | 66 Ldn | 56 | 56 | 56 | 56 | 61 | 67 |
| R3 | 7103 Norwalk Street | 2 | 239 | 62 Ldn | 57 | 57 | 57 | 57 | 59 | 64 |
| R4 | 1726 Baldwin Drive | 2 | 283 | 57 Ldn | 48 | 48 | 48 | 48 | 56 | 62 |
| R5 | 7405 Hallcrest Drive | 2 | 241 | 59 Ldn | 53 | 53 | 57 | 52 | 57 | 63 |
| **Tysons Corner** | | | | | | | | | | |
| R6 | 7798 Dolley Madison Boulevard | 3 | 90 | 66 Leq | n.a.[2] | n.a.[2] | n.a.[2] | n.a.[2] | 67 | 72 |
| R7 | 7900 Westpark Drive | 3 | 207 | 64 Leq | 56 | 56 | 56 | 53 | 65 | 70 |
| R8 | 7903 Westpark Drive | 3 | 169 | 63 Leq | 56 | 55 | 55 | 52 | 64 | 70 |
| R9 | 7925 Westpark Drive | 3 | 168 | 62 Leq | 55 | 55 | 54 | 50 | 64 | 70 |
| R10 | 8003 Westpark Drive | 3 | 194 | 59 Leq | 44 | 44 | 44 | 50 | 62 | 68 |
| R11 | 8248 Westpark Drive | 2 | 187 | 62 Ldn | 30 | 30 | 32 | 54 | 59 | 65 |
| R12 | The Rotonda International Drive | 2 | 176 | 62 Ldn | 53 | 32 | 52 | 50 | 59 | 65 |
| R13 | 1961 Chain Bridge Road | 3 | 263 | 66 Leq | 56 | 56 | 56 | 50 | 67 | 72 |
| R14 | 8332 Chain Bridge Road | 3 | 466 | 61 Leq | 33 | 29 | 55 | 51 | 63 | 69 |
| R15 | 8359 Leesburg Pike | 3 | 148 | 66 Leq | 32 | 30 | 51 | 50 | 66 | 72 |
| R16 | 8401 Westpark Drive | 2 | 294 | 63 Ldn | 57 | 31 | 54 | 51 | 60 | 65 |
| R17 | 8484 Leesburg Pike | 3 | 118 | 67 Leq | 58 | 35 | 59 | 58 | 67 | 73 |
| R18 | 8595 Leesburg Pike | 3 | 192 | 64 Leq | 56 | 56 | 54 | 56 | 65 | 71 |
| R19 | Westwood Village | 2 | 697 | 54 Ldn | 57 | 56 | 54 | 56 | 55 | 61 |
| R20 | 1468 Carrington Ridge Lane | 2 | 331 | 64 Ldn | 49 | 49 | 49 | 49 | 60 | 66 |
| **Mid-Corridor** | | | | | | | | | | |
| R21 | Filene Center (Wolf Trap Farm Park) | 1 | 492 | 54 Leq | 41 | 41 | 41 | 41 | 55 | 61 |
| R22 | 1533 Red Rock Court | 2 | 355 | 54 Ldn | 51 | 51 | 51 | 51 | 55 | 61 |

| Receptor | | FTA Land Use Category | Distance to Alignment (feet) | Existing Background Noise Levels | Alignment Noise Level (dBA) | | | | FTA Impact Criteria (dBA) | |
|---|---|---|---|---|---|---|---|---|---|---|
| No. | Description | | | | T1[1] | T6[1] | T9[1] | T4[1] | Impact | Severe Impact |
| R23 | 1606 Chathams Ford Drive | 2 | 481 | 63 Ldn | 56 | 56 | 56 | 56 | 60 | 65 |
| R24 | 1709 Landon Hill Road | 2 | 308 | 57 Ldn | 46 | 46 | 46 | 46 | 56 | 62 |
| R25 | 11810 Sunrise Valley Drive | 2 | 511 | 61 Ldn | 55 | 55 | 55 | 55 | 58 | 64 |
| R26 | 12708 Roark Court | 2 | 1,010 | 57 Ldn | 49 | 49 | 49 | 49 | 56 | 62 |
| R27 | 2204 Westcourt Lane | 2 | 406 | 69 Ldn | 58 | 58 | 58 | 58 | 64 | 69 |
| R28 | 1300 Apgar Place | 2 | 307 | 61 Ldn | 47 | 47 | 47 | 47 | 58 | 64 |
| **Loudoun County** | | | | | | | | | | |
| R29 | Rail S&I Yard (Y7) | 3 | 573 | 62 Leq | 47 | 47 | 47 | 47 | 64 | 69 |
| R30 | 21971 Shellhorn Road | 2 | 1,587 | 57 Ldn | 46 | 46 | 46 | 46 | 56 | 62 |

1 Assessment of Impact is determined as follows: No impact, Impact; and (Severe Impact).
2 Not applicable. Due to other developments along the Dulles Corridor (not associated with the project), several receptors will be "taken."
Source: *Dulles Corridor Rapid Transit Project Noise and Vibration Technical Report* (June 2002).

As shown in Table 4.7-24, corridor-wide project noise levels are predicted to exceed the FTA Category 2 Land Use *impact* criteria at 103 locations under Alignment T1, 101 locations under Alignment T6, 111 under Alignment T9 and T9 Design Option, and 102 locations under Alignment T4. Additionally, exceedances of the *severe impact* criteria are also predicted at three locations under the BRT/Metrorail Alternative due primarily to wheel squeal along the alignment as well as along the proposed West Falls Church rail yard lead. Similarly, project noise levels are also predicted to exceed the Category 3 Land Use *impact* criteria at an additional two locations under the BRT/Metrorail Alternative. No exceedances FTA Category 1 Land Use criteria are predicted under the BRT/Metrorail Alternative. Predicted corridor wide noise impacts under the T9 Design Option are equivalent to those predicted under Alignment T9.

**Table 4.7-24: Number of FTA Noise Impacts under the BRT/Metrorail Alternative**

| Corridor Section | Impact Criteria | Impacts by Alignment | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | T1 | | T6 | | T9 | | T4 | |
| | | FTA Land Use Category | | FTA Land Use Category | | FTA Land Use Category | | FTA Land Use Category | |
| | | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 |
| Orange Line Connection | Impact | 79 | 0 | 79 | 0 | 79 | 0 | 79 | 0 |
| | Severe | 3 | 0 | 3 | 0 | 3 | 0 | 3 | 0 |
| | Sum | 82 | 0 | 82 | 0 | 82 | 0 | 82 | 0 |
| Tysons Corridor | Impact | 17 | 0 | 15 | 0 | 25 | 0 | 16 | 0 |
| | Severe | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Sum | 17 | 0 | 15 | 0 | 25 | 0 | 16 | 0 |
| Mid Corridor | Impact | 5 | 2 | 5 | 2 | 5 | 2 | 5 | 2 |
| | Severe | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Sum | 5 | 2 | 5 | 2 | 5 | 2 | 5 | 2 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Dulles Airport | Impact | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Severe | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Sum | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Loudoun County | Impact | 2 | 0 | 2 | 0 | 2 | 0 | 2 | 0 |
| | Severe | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Sum | 2 | 0 | 2 | 0 | 2 | 0 | 2 | 0 |
| Totals | Impact | 103 | 2 | 101 | 2 | 111 | 2 | 102 | 2 |
| | Severe | 3 | 0 | 3 | 0 | 3 | 0 | 3 | 0 |
| | Sum | 106 | 2 | 104 | 2 | 114 | 2 | 105 | 2 |

Source: *Dulles Corridor Rapid Transit Project Noise and Vibration Technical Report* (June 2002).

### WMATA Criteria

Under the BRT/Metrorail Alternative, potential noise impacts from Metrorail operations (such as passbys and wheel squeal) were evaluated in the Orange Line Connection and Tysons Corner areas. As shown in Table 4.7-25, Lmax noise levels from train passbys and stationary events, such as public address announcements at the stations, would range from less than the ambient background noise at receptors located near underground sections of track in Tysons Corner, to 73 dBA at R17 (Ernst and Young building) in Tysons Corner due to train passbys. No exceedances of the WMATA design criteria are predicted under the BRT/Metrorail Alternative at any of the selected discrete receptors.

**Table 4.7-25: WMATA Noise Impact Summary at Discrete Receptors under the BRT/Metrorail Alternative**

| Receptor | | WMATA Land Use Category | Distance to Alignment (feet) | Alignment | | | | WMATA Impact Criteria (dBA) |
|---|---|---|---|---|---|---|---|---|
| **No.** | **Description** | | | **T1[1]** | **T6[1]** | **T9[1]** | **T4[1]** | |
| **Orange Line Connection** | | | | | | | | |
| R1 | Pavilion, Falls Church Drive | MFAM V | 474 | 58 | 58 | 58 | 58 | 85 |
| R2 | 2134 Greenwich Street | SFAM V | 327 | 68 | 68 | 68 | 68 | 80 |
| R3 | 7103 Norwalk Street | SFAM III | 239 | 70 | 70 | 70 | 70 | 75 |
| R4 | 1726 Baldwin Drive | SFAM III | 283 | 62 | 62 | 62 | 62 | 75 |
| R5 | 7405 Hallcrest Drive | MFAM V | 241 | 67 | 67 | 70 | 66 | 85 |
| **Tysons Corner** | | | | | | | | |
| R6 | 7798 Dolley Madison | COM IV | 90 | n.a.[2] | n.a.[2] | n.a.[2] | n.a.[2] | 85 |
| R7 | 7900 Westpark Drive | COM IV | 207 | 70 | 70 | 70 | 68 | 85 |
| R8 | 7903 Westpark Drive | COM IV | 169 | 69 | 69 | 69 | 67 | 85 |
| R9 | 7925 Westpark Drive | COM IV | 168 | 69 | 68 | 68 | 64 | 85 |
| R10 | 8003 Westpark Drive | COM IV | 194 | 58 | 58 | 58 | 64 | 85 |
| R11 | 8248 Westpark Drive | MFAM IV | 187 | 32 | 32 | 37 | 68 | 80 |
| R12 | The Rotonda, International Drive | MFAM IV | 176 | 67 | BD[3] | 66 | 60 | 80 |
| R13 | 1961 Chain Bridge Road | COM IV | 263 | 69 | 69 | 69 | 64 | 85 |
| R14 | 8332 Chain Bridge Road | COM IV | 466 | 39 | BD[3] | 68 | 66 | 85 |
| R15 | 8359 Leesburg Pike | COM IV | 148 | 35 | BD[3] | 65 | 64 | 85 |
| R16 | 8401 Westpark Drive | COM IV | 294 | 71 | BD[3] | 67 | 64 | 85 |
| R17 | 8484 Leesburg Pike | COM IV | 118 | 73 | BD[3] | 69 | 67 | 85 |
| R18 | 8595 Leesburg Pike | COM IV | 192 | 69 | 68 | 66 | 67 | 85 |

| Receptor | | WMATA Land Use Category | Distance to Alignment (feet) | Alignment | | | | WMATA Impact Criteria (dBA) |
|---|---|---|---|---|---|---|---|---|
| No. | Description | | | T1[1] | T6[1] | T9[1] | T4[1] | |
| R19 | Westwood Village | MFAM V | 697 | 70 | 70 | 67 | 70 | 85 |
| R20 | 1468 Carrington Ridge Lane | SFAM III | 331 | 63 | 63 | 63 | 63 | 75 |
| **Mid-Corridor** | | | | | | | | |
| R21 | Filene Center (Wolf Trap Farm Park) | Park | 492 | 55 | 55 | 55 | 55 | 65 |
| R22 | 1533 Red Rock Court | SFAM II | 355 | 64 | 64 | 64 | 64 | 75 |
| R23 | 1606 Chathams Ford Drive | SFAM II | 481 | 70 | 70 | 70 | 70 | 75 |
| R24 | 1709 Landon Hill Road | SFAM II | 308 | 59 | 59 | 59 | 59 | 75 |
| R25 | 11810 Sunrise Valley | COM V | 511 | 70 | 70 | 70 | 70 | 85 |
| R26 | 12708 Roark Court | SFAM III | 1,010 | 60 | 60 | 60 | 60 | 75 |
| R27 | 2204 Westcourt Lane | MFAM V | 406 | 71 | 71 | 71 | 71 | 80 |
| R28 | 13300 Apgar Place | MFAM III | 307 | 58 | 58 | 58 | 58 | 80 |
| **Loudoun County** | | | | | | | | |
| R29 | Rail S&I Yard (Y7) | COM V | 573 | 67 | 67 | 67 | 67 | 85 |
| R30 | 21971 Shellhorn Road | SFAM I | 1,587 | 60 | 60 | 60 | 60 | 70 |

1 Assessment of Impact is determined as follows: No Impact and Impact
2 Not applicable. Due to other developments along the Dulles Corridor (not associated with the project), several receptors would be "taken."
3 Below detection. Project levels at receptors near underground sections of track would be well below the ambient background level.
Source: *Dulles Corridor Rapid Transit Project Noise and Vibration Technical Report* (June 2002).

As shown in Table 4.7-26, single event Lmax noise levels under the BRT/Metrorail Alternative are predicted to exceed the WMATA design criteria at 18 locations (16 residential and 2 commercial).

**Table 4.7-26: Number of WMATA Noise Impacts under the BRT/Metrorail Alternative**

| Corridor Section | Land Use [1] | Impacts by Alignment | | | |
|---|---|---|---|---|---|
| | | T1 | T6 | T9 | T4 |
| Orange Line Connection | Residential | 11 | 11 | 11 | 11 |
| | Commercial | 1 | 1 | 1 | 1 |
| | Total | 12 | 12 | 12 | 12 |
| Tysons Corner | Residential | 0 | 0 | 0 | 0 |
| | Commercial | 0 | 0 | 0 | 0 |
| | Total | 0 | 0 | 0 | 0 |
| Mid Corridor | Residential | 1 | 1 | 1 | 1 |
| | Commercial | 1 | 1 | 1 | 1 |
| | Total | 2 | 2 | 2 | 2 |
| Dulles Airport | Residential | 0 | 0 | 0 | 0 |
| | Commercial | 0 | 0 | 0 | 0 |
| | Total | 0 | 0 | 0 | 0 |
| Loudoun County | Residential | 4 | 4 | 4 | 4 |
| | Commercial | 0 | 0 | 0 | 0 |
| | Total | 4 | 4 | 4 | 4 |

| | | | | | |
|---|---|---|---|---|---|
| Totals | Residential | 16 | 16 | 16 | 16 |
| | Commercial | 2 | 2 | 2 | 2 |
| | Total | 18 | 18 | 18 | 18 |

1 Residential (Res.) Land uses include all single- and multi-family buildings while commercial (Com.) receptors include all non-residential receptors such as offices. Other specific receptor types (Other) include schools and amphitheaters.
Source: *Dulles Corridor Rapid Transit Project Noise and Vibration Technical Report* (June 2002).

### Project Facilities

Overall noise levels from project facilities, including idling feeder buses and Metrorail auxiliary equipment, are predicted to be similar to those for the Metrorail Alternative. Wheel squeal from a 300-foot radius curve along a new rail yard lead at the West Falls Church S&I Yard is predicted to exceed the WMATA criteria at 24 residences in McLean. No other exceedances of the WMATA facility criteria are predicted under the BRT/Metrorail Alternative. Additionally, stationary facility noise levels are predicted to exceed the Fairfax County impact criteria at up to 263 residences under Alignment T4 (260 impacts as a result of wheel squeal at the West Falls Church S&I Yard and 3 impacts due to proposed stations and feeder bus stops) and up to seven commercial receptors under Alignment T9 and T9 Design Option.

### Historic Resources

As shown in Table 4.7-27, peak-hour Leq noise levels at historic resources are expected to range from 37 dBA at H5 (Wolf Trap Farm Park) to 47 dBA at H8 (Smith Bowman Distillery), and H9 (Sunset Hills). Similarly, 24-hour Ldn noise levels are predicted to range from 30 dBA at H13 (Middleton Farm) to 58 dBA at H10 (Wiehle/Sunset Hill Historic District). As a result, project noise levels under the BRT/Metrorail Alternative are predicted to exceed the FTA Land Use Category 2 criteria at location H18 as a result of BRT passbys. No exceedances of the FTA Land Use Category 2 or 3 criteria are predicted at any other historic resources identified in the study area.

**Table 4.7-27: FTA Noise Impact Summary from Transit Operations at Historic Resources under the BRT/ Metrorail Alternative (dBA)**

| Receptor | | FTA Land Use Category | Distance (feet) | Existing Background (dBA) | Alignment Noise Levels (dBA) | | | | FTA Impact Criteria (dBA) | |
|---|---|---|---|---|---|---|---|---|---|---|
| No. | Description | | | | T1[1] | T6[1] | T9[1] | T4[1] | Impact | Severe Impact |
| H1 | Lewinsville Post Office | 3 | 975 | 57 Leq | 43 | 43 | 44 | 43 | 61 | 67 |
| H2 | Bois de Gosses/Windy Hill | 2 | 2,601 | 59 Ldn | 43 | 43 | 47 | 43 | 57 | 63 |
| H3 | Shiloh Baptist Church | 3 | 4,303 | 66 Leq | 42 | 42 | 42 | 46 | 67 | 72 |
| H4 | Ash Grove | 2 | 447 | 54 Ldn | 42 | 42 | 42 | 42 | 55 | 61 |
| H5 | Wolf Trap Farm Park | 3 | 863 | 57 Leq | 37 | 37 | 37 | 37 | 61 | 67 |
| H6 | Plantation | 2 | 356 | 54 Ldn | 52 | 52 | 52 | 52 | 55 | 61 |
| H7 | Robert Wiehle House | 2 | 1,804 | 61 Ldn | 47 | 47 | 47 | 47 | 58 | 64 |
| H8 | Smith Bowman Distillery | 3 | 1,513 | 65 Leq | 47 | 47 | 47 | 47 | 66 | 71 |
| H9 | Sunset Hills | 3 | 1,776 | 65 Leq | 47 | 47 | 47 | 47 | 66 | 71 |
| H10 | Wiehle/Sunset Hills Historic Dist. | 2 | 1,513 | 61 Ldn | 63 | 63 | 63 | 63 | 58 | 64 |
| H11 | Launders House | 2 | 395 | 61 Ldn | 57 | 57 | 57 | 57 | 58 | 64 |
| H12 | Ratcliff/Meiselman House | 2 | 1,287 | 61 Ldn | 49 | 49 | 49 | 49 | 58 | 64 |
| H13 | Middleton Farm | 2 | 6,833 | 57 Ldn | 30 | 30 | 30 | 30 | 56 | 62 |
| H14 | Washington Dulles Int'l | n.a.[2] | n.a.[2] | n.a.[2] | n.a.[2] | n.a.[2] | n.a.[2] | n.a.[2] | n.a.[2] | n.a.[2] |

| Receptor | | FTA Land Use Category | Distance (feet) | Existing Background (dBA) | Alignment Noise Levels (dBA) | | | | FTA Impact Criteria (dBA) | |
|---|---|---|---|---|---|---|---|---|---|---|
| No. | Description | | | | T1[1] | T6[1] | T9[1] | T4[1] | Impact | Severe Impact |
| | Airport | | | | | | | | | |
| H15 | Cockerille House and Farm | 2 | 1,566 | 57 Ldn | 44 | 44 | 44 | 44 | 56 | 62 |
| H16 | House/Farm, Rte. 643 Ryan Road | 2 | 494 | 57 Ldn | 53 | 53 | 53 | 53 | 56 | 62 |
| H17 | House, Route. 772 Ryan Road | 2 | 416 | 57 Ldn | 52 | 52 | 52 | 52 | 56 | 62 |
| H18 | House, Route. 772 Ryan Road | 2 | 202 | 57 Ldn | 57 | 57 | 57 | 57 | 56 | 62 |

1 Assessment of impact is determined as follows: No Impact, Impact, and (Severe Impact).
2 Not applicable. The Dulles Airport Terminal Building is not sensitive to transit noise.
Source: *Dulles Corridor Rapid Transit Project Noise and Vibration Technical Report*, (June 2002).

### VDOT Impact Assessment Along the DAAR/Dulles Toll Road

Under the BRT/Metrorail Alternative, BRT service would be the same as under Alignment BRT 1 west of Tysons Corner. The peak-hour traffic noise levels under the BRT/Metrorail Alternative are predicted to be similar to those for the BRT Alternative. Therefore Metrorail pocket tracks are not proposed at the Wiehle Avenue Station because service would terminate at the Tysons West Station. As shown in Table 4.7-28, peak-hour Leq traffic noise levels under the BRT/Metrorail Alternative are expected to range from 60 dBA at the Reflection Homes to 71 dBA at the Sequant office building. No exceedances of the FHWA Land Use Category B (residences) are predicted at any receptor locations under the BRT/Metrorail Alternative. No exceedances of the VDOT "substantial increase over existing" criterion are predicted under the BRT/Metrorail Alternative. Due to the close proximity of the Sequant office building to the Dulles Toll Road, the peak-hour Leq noise level from future traffic under the BRT Alternative is predicted to approach within one decibel of the FHWA Land Use Category C criterion of 72 dBA at the building facade. No other exceedances of the FHWA Land Use Category C criterion are predicted under the BRT Alternative.

**Table 4.7-28: Peak-Hour Noise Impact Summary from Highway Traffic under the BRT/Metrorail Alternative (dBA)**

| Receptor Description | FHWA Land Use Category | Impact Criteria (dBA) | | Alternative Noise Levels (dBA) | |
|---|---|---|---|---|---|
| | | FHWA | VDOT | Existing | BRT/Metrorail |
| Olney Street (Orange Line Connection) | B | 67 | 67 | 57 | 61 |
| Airbus Office Building | C | 72 | 83 | 73 | 69 |
| Sequant Office Building, Sunrise Valley Drive | C | 72 | 77 | 67 | 71 |
| Reflection Homes | B | 67 | 65 | 55 | 60 |
| Homewood Suites Hotel | B | 67 | 67 | 57 | 61 |

Source: *Dulles Corridor Rapid Transit Project Noise and Vibration Technical Report* (June 2002).

### 4.7.5.5 Phased Implementation Alternative

Under the Metrorail Alternative, unique noise impacts related to BRT only (as identified under the BRT and BRT/Metrorail alternatives), would disappear after Metrorail service would be completed to Loudoun County. Additional activities under Phased Implementation would include the demolition of the Spring Hill Road Station and the BRT ramps between the Tysons West Station and the DAAR. No exceedances of the FTA or WMATA criteria are expected as a result of these interim construction or demolition activities. In addition,

noise impacts from temporary BRT service along the Orange Line Connection portion of the study area during the interim years are expected to be lower than predicted under the 2025 design year with full implementation of the BRT/Metrorail Alternative.

### 4.7.6 CONSTRUCTION EFFECTS

Noise levels from construction activities along the Dulles Corridor, although temporary, could create a nuisance condition at nearby sensitive receptors. Exposure to excessive noise levels varies depending on the types of construction activity and the types of equipment used for each stage of work. Project construction activities would include track-laying, station construction, bridge rehabilitation, feeder bus facility construction, and parking garage construction. The following subsections describe the predicted noise levels and potential noise impacts associated with the project construction activities.

#### 4.7.6.1 Baseline Alternative

No major construction activities are proposed as part of the Baseline Alternative. The Baseline Alternative includes changes to the operating characteristics of the existing transportation network separate from the Dulles Corridor Rapid Transit Project. Therefore, a construction impact assessment was not conducted for the Baseline Alternative.

#### 4.7.6.2 BRT Alternative

Under the BRT Alternative, construction activities would primarily include a parking garage, a bus maintenance and storage facility, some passenger station construction, and roadway re-alignments along the DAAR and Dulles Toll Road at the Herndon-Monroe and Route 28 stations. Construction noise impacts are expected to be minimal everywhere in the study area.

The distances at which an exceedance of the FTA daytime noise limits is predicted ranges from less than 15 feet at commercial receptors to less than 50 feet at residences. As a result, under the BRT Alternative, construction activities are not predicted to exceed the FTA daytime noise limit of 90 dBA at any residential receptor or 100 dBA at any non-residential locations. Similarly, for intermittent construction activities, no exceedances of the WMATA design criteria of 75 dBA for single- and multi-family residences, or 80 to 85 dBA for commercial receptors, are predicted under the BRT Alternative.

#### 4.7.6.3 Metrorail Alternative

Under the Metrorail Alternative, track-laying construction activities would occur from the Orange Line Connection to Dulles Airport and Loudoun County. Construction activities would also include bridges, parking garages, and S&I Yards. The distances at which an exceedance of the FTA daytime noise limits of 90 dBA at residential receptors is predicted ranges from 40 feet during at-grade track-laying to 56 feet during aerial track construction. The distances at which an exceedance of the FTA daytime noise limits of 100 dBA at commercial receptors will occur ranges from 13 feet during at-grade track-laying to only 15 feet during aerial track construction. As shown in Table 4.7-29, construction activities are predicted to exceed the FTA daytime noise limits at up to four residences during track-laying.

The distances at which an exceedance of the WMATA daytime noise limits of 75 dBA at residential receptors is predicted to range from 182 feet during at-grade track-laying to 223 feet during aerial track construction. The distances at which an exceedance of the WMATA daytime noise limits of 80 dBA at commercial receptors is

**Table 4.7-29: Summary of Construction Noise Impacts under the Metrorail Alternative**

| Scenario | | Federal Criteria (dBA)[1] | | | WMATA Criteria (dBA)[1] | | |
|---|---|---|---|---|---|---|---|
| | | Daytime Residential | Night-time Residential | Daytime Commercial | Daytime Residential | Daytime Commercial | Daytime Industrial |
| **No.** | **Description** | ***Criteria 90*** | ***Criteria 80*** | ***Criteria 100*** | ***Criteria 75-80*** | ***Criteria 80-85*** | ***Criteria 90*** |
| 1 | Track-Laying (At Grade) | 2 | n.a.[2] | 0 | 3 | 2 | 0 |
| 2 | Track-Laying (Aerial) | 2 | n.a.[2] | 0 | 2 | 0 | 0 |
| 3 | Stations Construction | 0 | n.a.[2] | 0 | 0 | 0 | 0 |
| 4 | Bridges Construction | 0 | n.a.[2] | 0 | 0 | 0 | 0 |
| 5 | Feeder Bus Facilities | 0 | n.a.[2] | 0 | 0 | 0 | 0 |
| 6 | Parking Lots/Garages | 0 | n.a.[2] | 0 | 0 | 0 | 0 |
| 7 | Rail and Bus Yards | 0 | n.a.[2] | 0 | 0 | 0 | 0 |
| 8 | Roadway Realignment | 0 | n.a.[2] | 0 | 0 | 0 | 0 |

1 The number of noise-sensitive receptors where maximum peak-hour construction noise levels are expected to exceed the FTA and WMATA daytime residential and commercial construction limits is shown for each construction scenario.
2 Not applicable. Construction activities were modeled assuming daytime operations only from 7 a.m. to 6 p.m.
Source: *Dulles Corridor Rapid Transit Project Noise and Vibration Technical Report* (June 2002).

predicted to range from 102 feet during at-grade track laying to 126 feet during aerial track construction. As shown in Table 4.7-29, construction activities under the Metrorail Alternative are predicted to exceed the WMATA daytime noise limits at up to five locations under alignments T1, T6, and T4. Similarly, construction activities are also predicted to exceed the WMATA criteria at two commercial receptors during track laying under Alignment T9 and T9 Design Option and one under Alignment T4.

#### 4.7.6.4 BRT/Metrorail Alternative

Under the BRT/Metrorail Alternative, construction activities would be the same as Metrorail to the Tysons West Station, and the same as the BRT Alternative from just beyond Tysons West to Route 772. Therefore, construction activities are predicted to have the same noise impacts over these sections of the study area. The FTA daytime noise limits would be exceeded at up to four residences during track-laying and the WMATA daytime noise limits would be exceeded at up to five residences and two commercial receptors during track-laying.

#### 4.7.6.5 Phased Implementation Alternative

Construction of this alternative would involve the implementation of BRT and Metrorail over an extended period of time. Although the construction effects would be the same as those described above for the other three alternatives, the timing would be different. The effects of constructing Metrorail through Tysons Corner would be added to the effects of constructing BRT between the Orange Line and Loudoun County. These effects would then be followed by the effects of constructing Metrorail between Tysons Corner and the end of the study area in Loudoun County.

### 4.7.7 MITIGATION

Measures available to mitigate the onset of noise impacts along the Dulles Corridor from BRT and Metrorail operations as well as during construction are described separately in the following subsections.

#### 4.7.7.1 BRT Alternative

The following available mitigation measures are specific to the BRT Alternative.

##### BRT Operations

Although noise levels from on-road vehicles are regulated by federal and state agencies, several mitigation measures are available to minimize or eliminate noise impacts predicted in the study area. These mitigation measures could include:

- Operational limitations to reduce the overall cumulative noise (such as peak-hour Leq and 24-hour Ldn noise levels). Such operational limitations could include:

  -Travel speed reductions along particularly noise-sensitive areas;

  -Nighttime restrictions to minimize the impacts at residential and other FTA Land Use Category 3 receptors during the quietest period of the day; and,

  -Restrictions on idling at stations closest to nearby noise-sensitive receptors.

- After-market noise silencers applied to the inside of the bus engine compartment. This would reduce overall engine noise during both passbys and during idling at stations. Noise silencers for bus engines would not, however, reduce rooftop exhaust noise.

##### Highway Traffic

Potential mitigation measures to eliminate exceedances of the VDOT and FHWA noise abatement criteria along the DAAR and Dulles Toll Road.

- Construction of noise barrier walls between the Dulles Toll Road and the affected receptor; and,
- Building sound insulation to reduce interior noise levels.

At the Sequant office building in Herndon, for example, the traffic noise levels under the BRT Alternative are predicted to approach the established criteria within 1 dBA triggering a mitigation investigation. However, office buildings and hotels with sealed or non-operable windows and primarily indoor uses do not have the same level of noise sensitivity as more "exposed" receptors. Additionally, noise barriers are ineffective in reducing highway noise on the upper levels of a multi-level building, such as an office building. Mitigation measures, such as noise barriers, will be investigated in greater detail during final design when the alignment designs are finalized.

##### Construction Activity

Noise control measures can be included in the construction specification documents to ensure compliance with all federal and WMATA guidelines and noise limits. These specifications could require contractors to use properly maintained and operated equipment, including the use of exhaust mufflers according to the equipment manufacturer's specifications. Additional noise control measures could be incorporated into the construction specification documents as determined to be necessary during final design.

The FTA guidelines and procedures identify several areas of potential noise control including:

- Temporary noise barriers erected between noisy activities and noise-sensitive receptors;
- Use of sonic/vibratory pile-drivers rather than impact pile-driving near noise-sensitive receptors; and,
- Re-routing construction traffic along roadways that minimize noise impacts at nearby noise-sensitive receptors.

### 4.7.7.2 Metrorail Alternative

The following mitigation measures are specific to the Metrorail Alternative.

#### Metrorail Operations

Noise impacts due to Metrorail operations, including train passbys and wheel squeal along tight radius curves, were predicted at several locations under the Metrorail Alternative. Track design includes 3-foot parapets along aerial sections of track adjacent to residential areas. However, several exceedances of the FTA and WMATA criteria are still predicted. Further investigation revealed that 5-foot barriers in specific locations along both aerial and at-grade sections of track would eliminate nearly all of the anticipated impacts. As a result of the noise impact assessment, additional parapet barriers are recommended along both aerial and at-grade sections of track at the following approximate locations as shown in Table 4.7-30 and in Figures 4.7-5a and 4.7-5b pending further investigation during final design.

**Table 4.7-30: Location of Additional Parapet Barriers with Metrorail Alternative**

| Station Location | Section | Height[1] | Linear Feet |
|---|---|---|---|
| **Outbound side of the Metrorail Corridor** | | | |
| Sta. No. 474+00 to 482+00 | Orange Line Connection | 5-foot barriers | 800 |
| Sta. No. 727+00 to 735+00 | Orange Line Connection | 5-foot barriers | 800 |
| Sta. No. 744+00 to 752+00 | Orange Line Connection | 5-foot barriers | 800 |
| Sta. No. 778+00 to 786+00 | Orange Line Connection | 5-foot barriers | 800 |
| Sta. No. 833+00 to 863+00 | Orange Line Connection | 5-foot barriers | 3,000 |
| Sta. No. 1240 to 1248+00 | Mid-Corridor | 5-foot barriers | 800 |
| Sta. No. 1372+00 to 1380+00 | Mid-Corridor | 5-foot barriers | 800 |
| **Inbound side of the Metrorail Corridor** | | | |
| Sta. No. 481+00 to 489+00 | Orange Line Connection | 5-foot barriers | 800 |
| Sta. No. 729+00 to 737+00 | Orange Line Connection | 5-foot barriers | 800 |
| Sta. No. 778+00 to 786+00 | Orange Line Connection | 5-foot barriers | 800 |
| Sta. No. 788+00 to 796+00 | Orange Line Connection | 5-foot barriers | 800 |
| Sta. No. 815+00 to 845+00 | Orange Line Connection | 5-foot barriers | 3,000 |
| Sta. No. 855+00 to 863+00 | Orange Line Connection | 5-foot barriers | 800 |
| Sta. No. 1019+00 to 1039+00 | Tysons Corner | 5-foot barriers | 2,000 |
| Sta. No. 1116+00 to 1124+00 | Mid-Corridor | 5-foot barriers | 800 |
| Sta. No. 1436+00 to 1444+00 | Mid-Corridor | 5-foot barriers | 800 |

[1] Proposed barrier height determined by mitigation analysis measured from top of rail. Actual barrier height as measured from outside of structure will conform to WMATA design criteria (6 feet).

At most individual impact locations, an estimated barrier length of approximately 800 feet is assumed to be needed. The actual dimensions of the proposed barriers will be investigated during final design using spectral data (i.e., octave band analysis) to provide a more detailed estimate of the barrier insertion losses at the impacted receptors. Barriers should also include an absorptive coating to eliminate the potential for noise reflections

Mitigation measures to eliminate impacts predicted at the proposed mixed-use development adjacent to the Route 28 Station south parking facilities should be investigated during final design. These measures will include lot line barriers to shield motor vehicle engine noise and other feeder bus activity from the nearby residences.

At residences adjacent to the West Falls Church S&I Yard, noise from wheel squeal along the proposed yard lead is predicted to result in an impact. However, because the barrier shielding necessary to reduce the impact

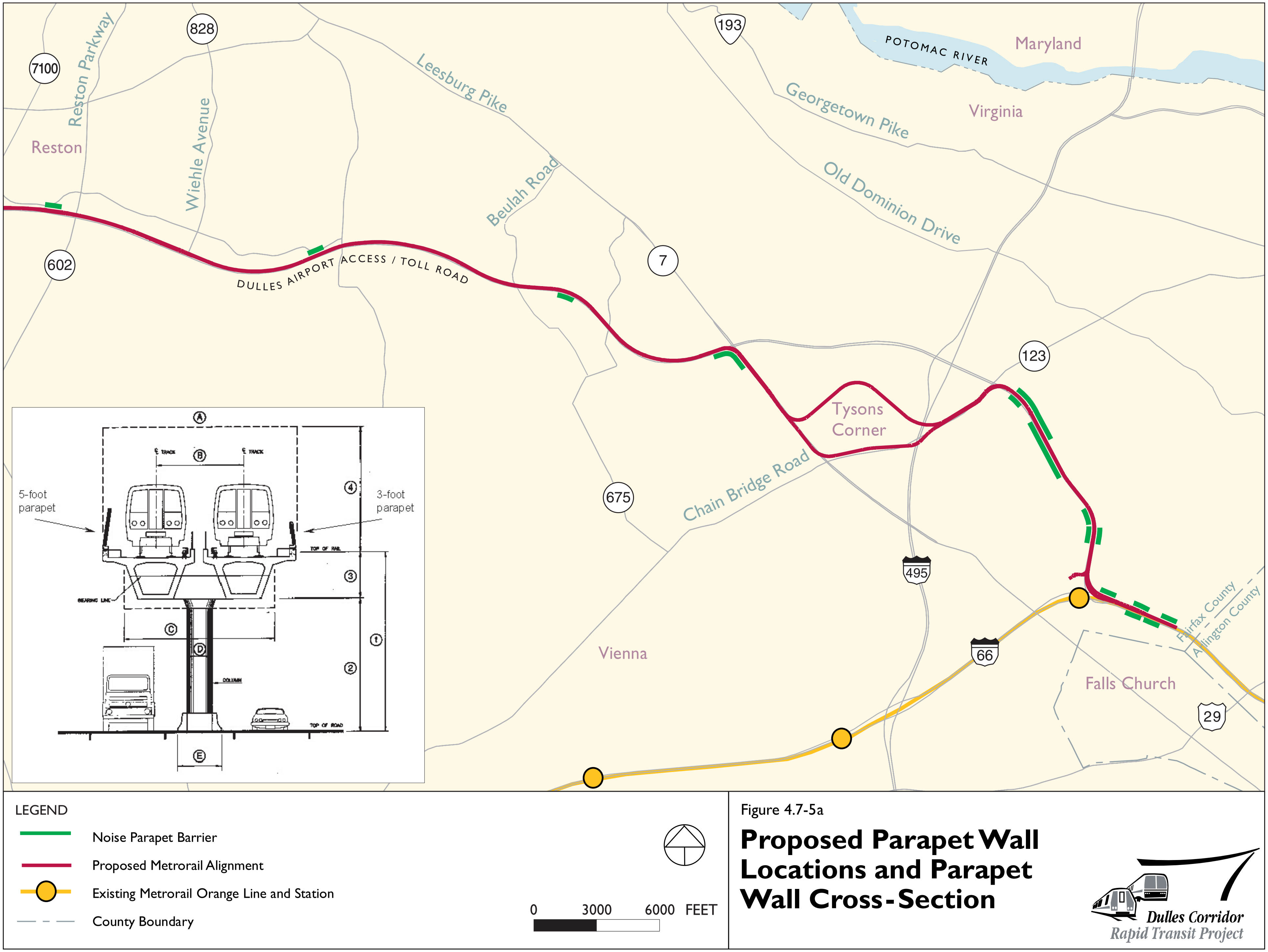



Figure 4.7-5a

**Proposed Parapet Wall Locations and Parapet Wall Cross-Section**

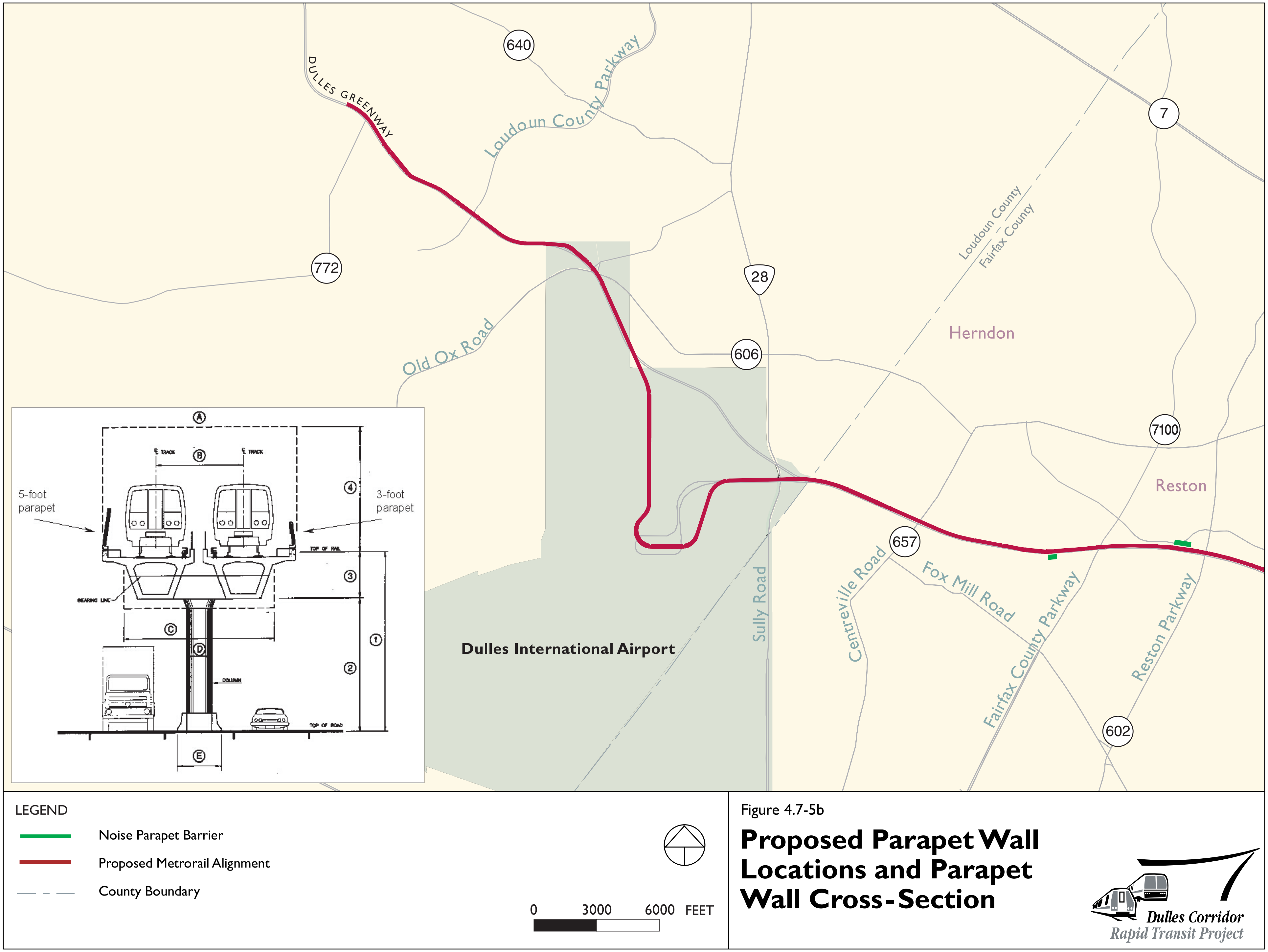



Figure 4.7-5b

# Proposed Parapet Wall Locations and Parapet Wall Cross-Section

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is greater than the maximum shielding allowed by the FTA insertion loss algorithms (i.e., the FTA limits the total amount of shielding predicted by a barrier), the WMATA S&I Yard criteria would still be exceeded. To eliminate these "residual" impacts, several additional mitigation measures are possible to reduce the predicted impacts including:

- Operational limitations to reduce the overall cumulative noise (such as peak-hour Leq and 24-hour Ldn noise levels). Such operational limitations could include:

  -Travel speed reductions along particularly noise-sensitive areas; and

  -Nighttime restrictions to minimize the impacts at residential and other FTA Land Use Category 2 receptors during the quietest period of the day.

Completely enclosing the curved yard lead similar to the tunnel section, thereby eliminating wheel squeal noise from reaching the nearby residences;

- Building insulation to reduce transit noise inside the affected structure. Outdoor activities, however, would not benefit from sound insulation;
- Application of petroleum lubricants to the track surface (such as is currently being used) to minimize the overall impact on nearby noise-sensitive residences; and,
- A detailed investigation during final design to determine barrier insertion losses based on wheel squeal spectral data (i.e., octave-band data) rather than the A-weighted analysis using the FTA methodology.

Although typically not part of the environmental review process, noise impacts on the S&I Yard employees using the OSHA criteria will be evaluated during final design when details of the yard are better known.

#### Highway Traffic

The mitigation measures discussed under the BRT Alternative are also applicable under the Metrorail Alternative.

#### Construction Activity

The available construction mitigation measures under the Metrorail Alternative are the same as was described under the BRT Alternative.

#### S&I Yard

Noise impacts on employees at Site 15 will be evaluated using Occupational Health and Safety Administration (OSHA) criteria during the final design when details of the S&I Yard layout are better known, if that site is selected.

### 4.7.7.3 BRT/Metrorail Alternative

The following available mitigation measures are specific to the BRT/Metrorail Alternative.

#### BRT Operations

The available BRT mitigation measures under the BRT/Metrorail Alternative are the same as were described for the BRT Alternative.

#### Metrorail Operations

Noise impacts from Metrorail operations, including train passbys and wheel squeal along tight radius curves, were predicted at several locations under the BRT/Metrorail Alternative. Track design includes 3-foot parapets along aerial sections of track only in sensitive noise locations (e.g. residential areas). However, several

exceedances of the FTA and WMATA criteria are still predicted. Further investigation revealed that 5-foot barriers in specific locations would eliminate nearly all of the anticipated impacts. As a result of the noise impact assessment, additional parapet barriers are recommended at the following approximate locations shown in Table 4.7-31 pending further investigation during final design.

**Table 4.7-31: Location of Additional Parapet Barriers with Phased implementation**

| Station Location | Section | Height[1] | Linear Feet |
|---|---|---|---|
| **Outbound side of the Metrorail Corridor** | | | |
| Sta. No. 474+00 to 482+00 | Orange Line Connection | 5-foot barriers | 800 |
| Sta. No. 727+00 to 735+00 | Orange Line Connection | 5-foot barriers | 800 |
| Sta. No. 744+00 to 752+00 | Orange Line Connection | 5-foot barriers | 800 |
| Sta. No. 778+00 to 786+00 | Orange Line Connection | 5-foot barriers | 800 |
| Sta. No. 833+00 to 863+00 | Orange Line Connection | 5-foot barriers | 3,000 |
| **Inbound side of the Metrorail Corridor** | | | |
| Sta. No. 481+00 to 489+00 | Orange Line Connection | 5-foot barriers | 800 |
| Sta. No. 729+00 to 737+00 | Orange Line Connection | 5-foot barriers | 800 |
| Sta. No. 778+00 to 786+00 | Orange Line Connection | 5-foot barriers | 800 |
| Sta. No. 788+00 to 796+00 | Orange Line Connection | 5-foot barriers | 800 |
| Sta. No. 815+00 to 845+00 | Orange Line Connection | 5-foot barriers | 3,000 |
| Sta. No. 855+00 to 863+00 | Orange Line Connection | 5-foot barriers | 800 |

[1] Proposed barrier height determined by mitigation analysis measured from top of rail. Actual barrier height as measured from outside of structure will conform to WMATA design criteria (6 feet).

The potential mitigation measures discussed under the Metrorail Alternative for impacts due to the wheel squeal along the proposed yard lead at the West Falls Church S&I Yard and the parking facility at the Route 28 Station are also applicable for the BRT/Metrorail Alternative.

### Highway Traffic

The available mitigation measures discussed for the BRT Alternative also would be applicable for the BRT/Metrorail Alternative.

### Construction Activity

The available construction mitigation measures for the BRT/Metrorail Alternative would be the same as was described for the BRT/Metrorail Alternative.

### 4.7.7.4 Phased Implementation Alternative

Due to the sensitivity of residents to potential noise impacts, any noise mitigation measures identified for noise sources operating during the interim phases of the project (such as BRT-only impacts under the BRT Alternative) should be implemented, even if they would not be required for subsequent phases of the project. Any temporary impacts identified for the interim BRT service (as predicted under the BRT Alternative) would be mitigated as part of the phased implementation of the Metrorail Alternative. Mitigation measures to reduce noise impacts from BRT operations are described in Section 4.7.7.1.

## 4.7.8 SUMMARY OF EFFECTS

Table 4.7-32 provides a summary of the noise impacts anticipated for all alternatives. In addition, mitigation measures proposed are shown in Figure 4.7-5.

**Table 4.7-32: Summary of Noise Effects**

| Alternative | FTA Category 2 Impacts | FTA Category 3 Impacts | WMATA Impacts | Mitigation |
|---|---|---|---|---|
| Baseline | None | None | None | None |
| BRT 1 | 77 | 2 | 10 | Parapet barriers; speed restrictions; building insulation |
| BRT 2 | 65 | 0 | 10 | Parapet barriers; speed restrictions; building insulation |
| BRT 3 | 81 | 1 | 12 | Parapet barriers; speed restrictions; building insulation |
| Metrorail T1 | 120 | 2 | 17 | Parapet barriers; speed restrictions; building insulation |
| Metrorail T6 | 112 | 2 | 17 | Parapet barriers; speed restrictions; building insulation |
| Metrorail T9 | 112 | 2 | 16 | Parapet barriers; speed restrictions; building insulation |
| Metrorail T4 | 117 | 2 | 16 | Parapet barriers; speed restrictions; building insulation |
| BRT/Metrorail | 104 – 114 | 2 | 18 | Parapet barriers; speed restrictions; building insulation |
| Phased Implementation | 112 – 120 | 2 | 16 – 17 | Parapet barriers; speed restrictions; building insulation |

## 4.8 VIBRATION

This section introduces some basic ground-borne vibration and noise concepts, including the prediction methodologies and modeling assumptions used for the project, the results of the existing source vibration measurement program, and the evaluation of impacts in the study area. Additional information regarding vibrations in the project corridor is provided in the *Noise and Vibration Technical Report* (June 2002).

### 4.8.1 HUMAN PERCEPTION OF VIBRATION

The characteristics and properties used to describe ground-borne vibration and noise are explained in the following subsections.

#### 4.8.1.1 Describing Vibration

Ground-borne vibration associated with vehicle movements is usually the result of uneven interactions between the wheel and the road or rail surfaces. Examples of such interactions (and subsequent vibrations) include train wheels over jointed rail, an untrue railcar wheel with "flats," and motor vehicle wheels hitting a pothole or even a manhole cover.

Unlike noise, which travels in air, transit vibration typically travels along the surface of the ground. Depending on the geologic properties of the surrounding ground and the type of building structure exposed to transit vibration, vibration propagation may be more or less efficient. Buildings with a solid foundation set in bedrock are "coupled" more efficiently to the surrounding ground and experience relatively higher vibration levels than those buildings located in sandy soil.

Similarly, ground-borne noise results from vibrating room surfaces located near a heavily traveled transit corridor, such as a subway line. As a result, annoyance to the "rumbling" sound from ground-borne noise is only evaluated indoors and is described using the A-weighted decibel.

#### 4.8.1.2 Vibration Descriptors

Vibration induced by vehicle passbys can generally be discussed in terms of displacement, velocity, or acceleration. However, human responses and responses by monitoring instruments and other objects are more accurately described with velocity. Therefore, the vibration velocity level is chosen to assess vibration impacts.

To describe the human response to vibration, the average vibration amplitude called the root mean square (RMS) amplitude, is used to assess impacts. The RMS velocity is expressed in inches per second (ips) or decibels (VdB). Vibration levels are referenced to 1 micro inch per second (μips).

To evaluate the potential for damage to buildings, the peak particle velocity (PPV) is also used to characterize the vibration. Typically expressed in units of ips, PPV represents the maximum instantaneous vibration velocity observed during an event. Typical ground-borne vibration levels from transit and other common sources are shown in Figure 4.8-1.

### 4.8.2 EVALUATION CRITERIA

As described in the following subsections, both the FTA and the WMATA criteria were used to assess annoyance due to vibration and ground-borne noise from single-event transit operations.

#### 4.8.2.1 Operational Vibration

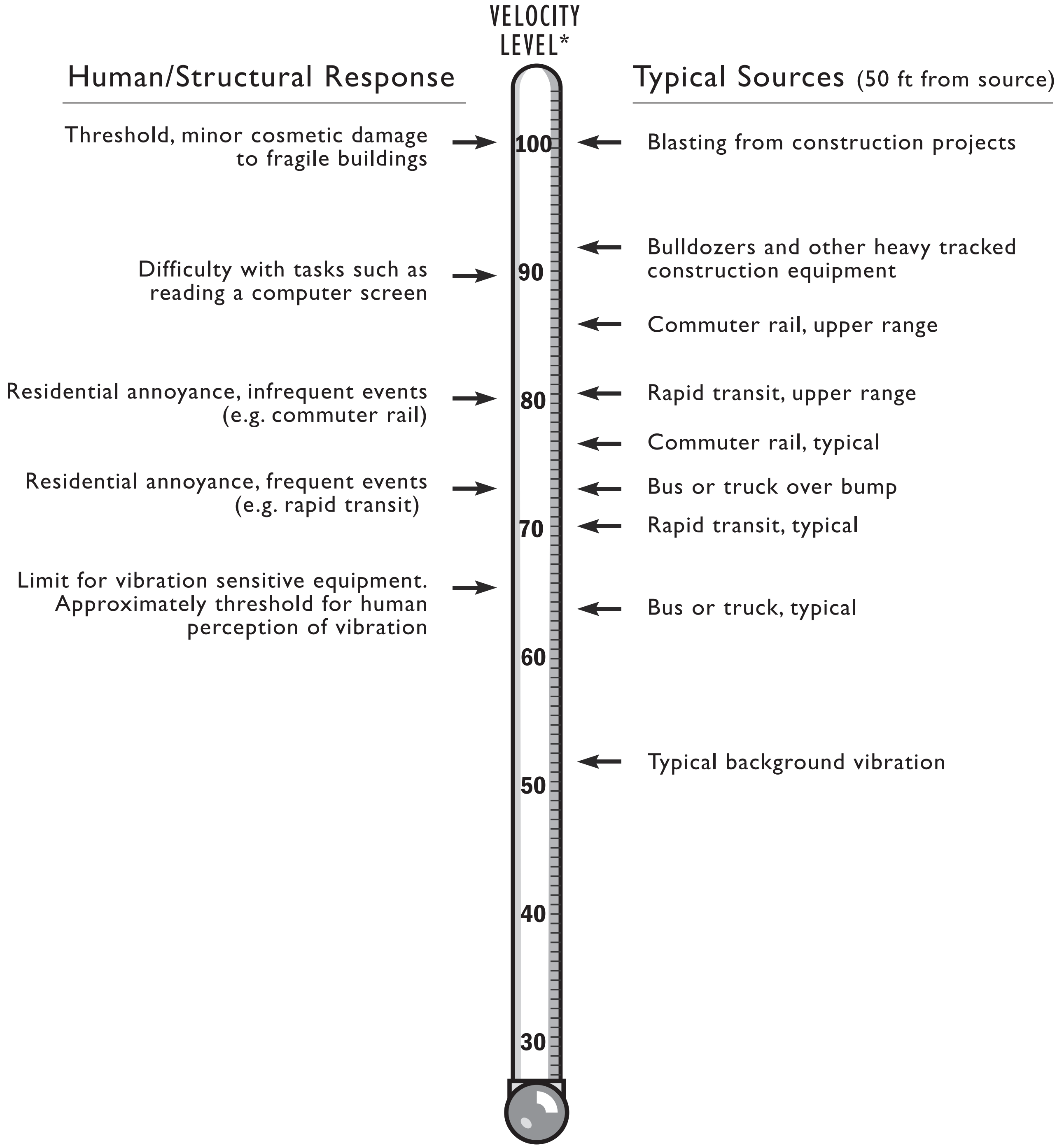
Both FTA and WMATA criteria are used to evaluate vibration from single-event transit passbys.

**Federal Criteria**

The FTA vibration criteria for evaluating ground-borne vibration impacts from train passbys at nearby sensitive receptors are shown in Table 4.8-1. These vibration criteria are related to ground-borne vibration levels that are expected to result in human annoyance, and are based on RMS velocity levels expressed in VdB relative to 1 μips. The FTA's experience with community response to ground-borne vibration indicates that when there are only a few train events per day, it would take higher vibration levels to evoke the same community response that would be expected from more frequent events. This is taken into account in the FTA criteria by distinguishing between projects with frequent and infrequent events, where the frequent-events category is defined as more than 70 events per day. The vibration criteria levels shown in Table 4.8-1 are defined in terms of human annoyance for different land use categories such as high sensitivity (Category 1), residential (Category 2), and institutional (Category 3). In general, the threshold of human perceptibility of vibration is approximately 65 VdB.

The vibration levels shown in Table 4.8-1 are well below the damage criteria levels of approximately 95 to 100 VdB. It is extremely rare for vibration from train operations to cause any sort of building damage, including minor cosmetic damage. The potential for damage from vibratory or impact devices are discussed further under the construction criteria.

While vibration criteria are generally used to assess annoyance from transit sources at the exterior facade of receptors, ground-borne noise, or the rumbling sound due to vibrating room surfaces, is typically assessed




Source: *Transit Noise and Vibration Impact Assessment-Final Report.* Federal Transit Administration, Washington, D.C., April 1995

* RMS Vibration Velocity Level in VdB relative to $10^{-6}$ inches/second

Figure 4.8-1

## Typical Ground-Borne Vibration Levels

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**Table 4.8-1: FTA Ground-Borne Vibration Impact Criteria for Annoyance**

| Receptor Land Use | | RMS Vibration Levels (VdB) | | Ground-Borne Noise Levels (dBA) | |
|---|---|---|---|---|---|
| **Category** | **Description** | **Frequent Events** | **Infrequent Events** | **Frequent Events** | **Infrequent Events** |
| 1 | Buildings where low vibration is essential for interior operations | 65 | 65 | n.a.[1] | n.a.[1] |
| 2 | Residences and buildings where people normally sleep | 72 | 80 | 35 | 43 |
| 3 | Daytime institutional and office use | 75 | 83 | 40 | 48 |
| Specific Buildings | TV/Recording Studios/Concert Halls | 65 | 65 | 25 | 25 |
| | Auditoriums | 72 | 80 | 30 | 38 |
| | Theaters | 72 | 80 | 35 | 43 |

1 Not applicable. Vibration-sensitive equipment, for example, is not sensitive to ground-borne noise.
Source: *Transit Noise and Vibration Impact Assessment - Final Report*, Federal Transit Administration, Washington, D.C., April 1995.

indoors. In general, the relationship between vibration and ground-borne noise depends on the dominant frequency of the vibration and the acoustical absorption characteristics of the receiving room. Due to the limited data available regarding soil and ground propagation characteristics, average or typical soil conditions were assumed everywhere along the corridor for computing ground-borne noise.

### WMATA Criteria

Similar to the FTA criteria, the WMATA vibration and ground-borne noise criteria were developed for various community land use categories, as well as for specific building types. As shown in Table 4.8-2, the WMATA criteria were used to assess impacts from single event passbys for each of the project alternatives that include Metrorail.

**Table 4.8-2: WMATA Criteria for Single Event Maximum Vibration and Ground-Borne Noise from Metrorail Operations**

| Community Area Category | | RMS Vibration Levels (VdB)[1] | | | Ground-Borne Noise Levels (dBA)[1] | | |
|---|---|---|---|---|---|---|---|
| | | **SFAM** | **MFAM** | **COM** | **SFAM** | **MFAM** | **COM** |
| I | Low-density Residential | 70 | 70 | 70 | 30 | 35 | 40 |
| II | Average Residential | 70 | 70 | 75 | 35 | 40 | 45 |
| III | High-density Residential | 70 | 75 | 75 | 35 | 40 | 45 |
| IV | Commercial | 70 | 75 | 75 | 40 | 45 | 45 |
| V | Industrial/Highway | 75 | 75 | 75 | 40 | 45 | 50 |
| **Specific Building Types** | | **RMS Vibration Levels (VdB)** | | | **Ground-Borne Noise Levels (dBA)** | | |
| Concert Halls, Television Studios | | 65 | | | 25 | | |
| Auditoriums and Music Rooms | | 70 | | | 30 | | |
| Church, Theaters, & Hospitals | | 70 | | | 35 | | |
| Courtrooms, Universities, Offices | | 75 | | | 35 | | |
| Schools and Libraries | | 75 | | | 40 | | |
| Commercial Buildings | | 75 | | | 45 | | |
| Industrial Buildings | | 75 | | | n.a.[2] | | |
| Vibration-Sensitive Laboratories | | 60 | | | n.a.[2] | | |

1 Land use categories include single-family (SFAM), multi-family (MFAM), and commercial (COM) receptors.
2 Not applicable. Industrial buildings and laboratories are not sensitive to ground-borne noise.
Source: *WMATA Noise and Vibration Design Criteria* (2001).

#### 4.8.2.2 Construction Vibration

Vibration impacts due to construction activities were assessed using the FTA and the WMATA criteria to determine the onset of annoyance and structural damage.

**Federal Criteria**

Federal criteria for vibration incorporate the same land use categories as those used in transit noise analyses. Consequently, land is divided into Category 1—pristine land uses, Category 2—residences, and Category 3—institutional receptors.

The vibration levels shown in Table 4.8-1 were used to evaluate vibration annoyance from various construction scenarios expected in the study area. Additionally, depending on the construction activity, there is sometimes concern about damage to fragile or older historic buildings closest to heavy-duty construction activities. Even in these cases, damage is unlikely to occur except when the construction equipment is very close to the building structure. The recommended FTA criteria limits that were used to assess minor structural damage, such as small cracks in plaster walls, in PPV are 0.20 ips for fragile buildings and 0.12 ips for extremely fragile or older historic buildings.

**WMATA Criteria**

As shown in Table 4.8-3 PPV vibration levels from construction activities were also evaluated against the WMATA design criteria at the nearest occupied buildings. Unlike the FTA damage thresholds, the WMATA limits are used to evaluate the potential for annoyance and interference to occupants of affected buildings.

**Table 4.8-3: WMATA PPV Vibration Criteria from Construction Activities**

| Activity Type | Activity Duration | Land use Type | Vibration Limit (ips) |
|---|---|---|---:|
| Sustained | More than 1 hour/day | All Areas | 0.03 |
| Intermittent | Less than 1 hour/day | All Areas | 0.07 |
| Intermittent | Less than 10 min/day | All Areas | 0.10 |

Source: WMATA Noise and Vibration Design Criteria (2001).

### 4.8.3 MODELING METHODOLOGY AND ASSUMPTIONS

The modeling methodologies and the types of vibration sources included in the modeling prediction are described in the following subsections. Complete details of the modeling methodologies and data assumptions are discussed in the *Noise and Vibration Technical Report* (June 2002).

#### 4.8.3.1 Operations

Vibration levels from Metrorail passbys at sensitive receptors in the study area were determined using the FTA guidelines. Although BRT operations are also proposed, rubber-tired vehicles, especially transit buses, are typically not a major source of vibration annoyance. Therefore, only railcar passbys along continuously welded rail track and rail discontinuities such as switches and crossovers, were included in the modeling analysis.

A vibration measurement program was conducted to better determine the extent of ground-borne vibration levels from existing Metrorail trains as well as provide insight into the type of soil conditions found in the study area. The results of the measurement program are discussed in Section 4.8.4.

#### 4.8.3.2 Construction

The same methodology used to assess construction noise was also used to assess construction vibration levels in the study area. Similar to the noise assessment, example equipment was selected for each construction scenario that would contribute to worst-case vibration conditions at nearby receptors.

The impact assessment was based on the types of equipment that are typically used for each construction activity. Vibration levels from typical construction equipment are provided in the FTA guidelines at a reference distance of 50 feet. These levels were used to estimate the onset of impact at nearby sensitive receptors for each of the different construction activities. The following construction scenarios were selected to be representative of the types of construction activities expected in the study area:

- Track-Laying (At Grade),
- Track-Laying (Aerial),
- Rail Passenger Station Construction,
- Road and Bridge Construction,
- Feeder Bus Facility Construction,
- Park-and-ride Garage Construction,
- Rail Service and Inspection Yards, and
- Bus Maintenance and Storage Facility.

The equipment types and the maximum FTA reference vibration levels are shown in Table 4.8-4 for each of the selected construction scenarios. Although numerous equipment types would eventually be used during each scenario, only two equipment types were selected to maximize the potential overall vibration levels during the preliminary impact assessment.

**Table 4.8-4: Construction Scenario Equipment Vibration Reference Levels**

| Construction Equipment Type Description | Construction Scenario | | | | | | |
|---|---|---|---|---|---|---|---|
| | Track Laying | | Rail Stations | Roads & Bridges | Feeder Bus Lots | Parking Garage | Rail & Bus Yards |
| | At Grade | Aerial | | | | | |
| **RMS (VdB)** | | | | | | | |
| Jack Hammer | –[1] | –[1] | –[1] | 79 | –[1] | –[1] | –[1] |
| Bulldozer | 87 | 87 | 87 | –[1] | 87 | 87 | 87 |
| Truck, Loaded | 86 | 86 | 86 | 86 | 86 | 86 | 86 |
| **PPV (ips)** | | | | | | | |
| Jack Hammer | –[1] | –[1] | –[1] | 0.035 | –[1] | –[1] | –[1] |
| Bulldozer | 0.089 | 0.089 | 0.089 | –[1] | 0.089 | 0.089 | 0.089 |
| Truck, Loaded | 0.076 | 0.076 | 0.076 | 0.076 | 0.076 | 0.076 | 0.076 |

1 Equipment type not included in the prediction modeling for this construction scenario.
Source: *Noise and Vibration Technical Report* (June 2002).

### 4.8.4 EXISTING CONDITIONS

The scope and results of the vibration monitoring program are described in the following section.

#### 4.8.4.1 Transit Source Levels

Vibration measurements were conducted along an existing Metrorail line to determine the vibration propagation characteristics of the existing terrain and the vibration levels of a Metrorail train passby. These reference vibration levels were used to provide a more detailed understanding of the ground propagation characteristics in the study area. These measurements were also used to supplement the vibration curves contained in the FTA guidelines. Vibration measurements were not collected from BRT vehicle passbys because: (1) rubber-tired transit vehicles are typically not a significant source of vibration and (2) no vibration-sensitive receptors were identified within the FTA screening distance of 50 feet for transit buses.

As shown in Figure 4.8-2, the ground-surface propagation curves developed from the measured data observed along the Metrorail Blue Line near Arlington Cemetery Station are approximately 3 VdB lower than the FTA curve for rapid transit vehicles. Although vibration measurements were conducted in soil with average clay content, the soil characteristics may vary considerably from one location to another along the study area. With typical variation of geological soil conditions expected, combined with the considerable distance of the measurement location from the active project corridor, it is difficult to generalize the measured vibration wave propagation characteristics along the entire study area. Therefore, the FTA surface curves were used in the modeling prediction to provide a slightly more conservative estimate than was actually measured.

The ground-borne vibration frequency spectrum of a train passby was also measured to determine the type of soil conditions. Following the FTA guidelines, ground-borne vibration levels could be converted to ground-borne noise using an empirical relationship between soil type and magnitude of the ground-borne noise. The measured ground-borne vibration levels observed during the monitoring program confirm average soil conditions. Therefore, average soil conditions were used to predict the ground-borne noise levels at all receptor locations in the study area.

### 4.8.5 LONG-TERM EFFECTS

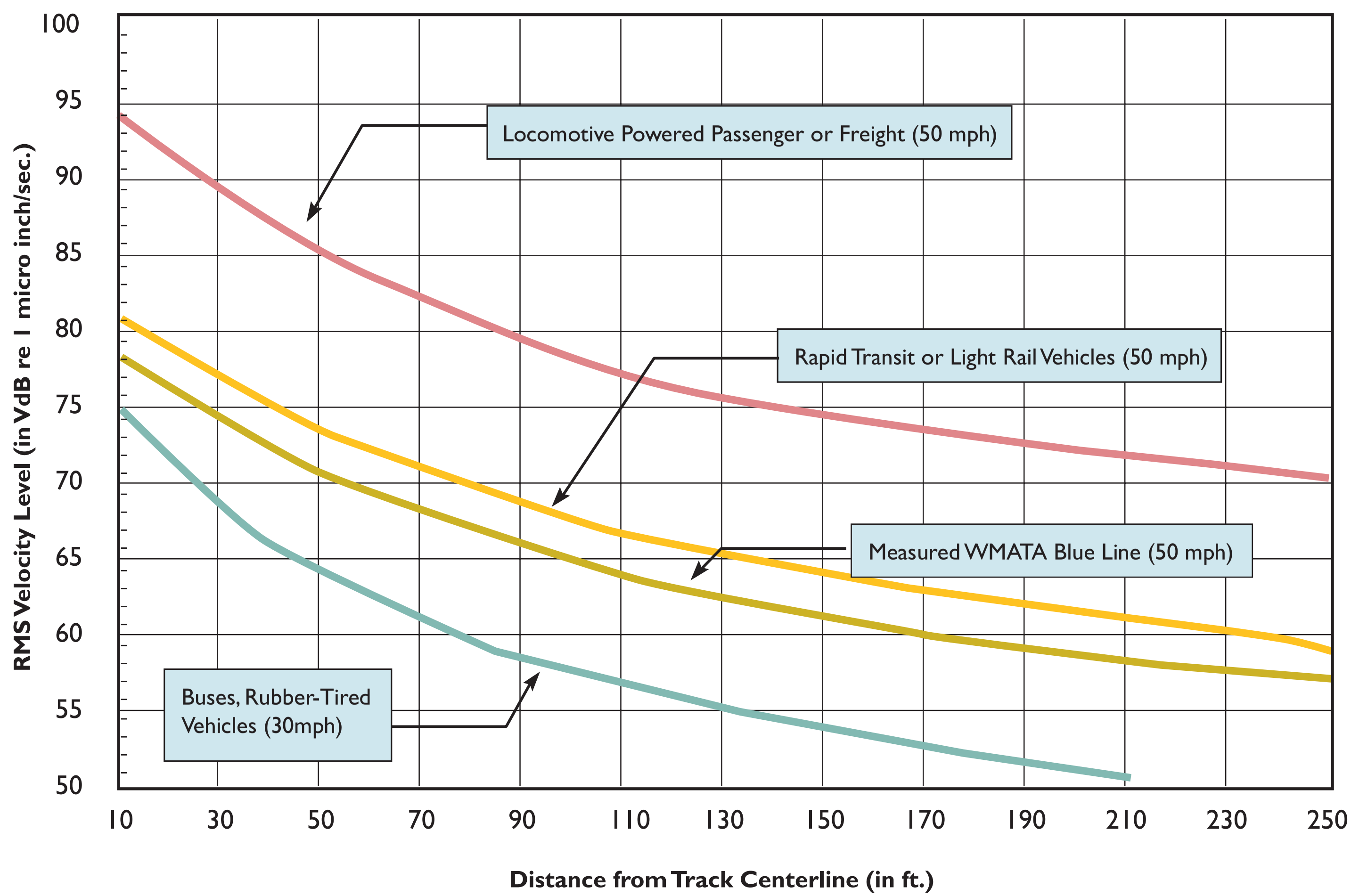
Vibration impacts from Metrorail vehicles were evaluated at discrete receptors using the FTA and WMATA criteria based on maximum single event passbys as described in the following sections (see Figure 4.8-3). Unlike the cumulative noise criteria, vibration criteria are evaluated based on single-event passbys. The results of the impact assessment are described in the following subsections.

#### 4.8.5.1 Baseline Alternative

In accordance with FTA guidelines, vibration impacts are only assessed from new proposed vibration sources such as Metrorail passbys. Under the Baseline Alternative, neither the BRT nor the Metrorail would be in service along the Dulles Corridor. Therefore, because no new sources of vibration are expected under the Baseline Alternative, a vibration impact assessment is not required.

#### 4.8.5.2 BRT Alternative

Due to their lighter weight (compared to trains or large trucks), rubber-tired transit vehicles are typically not a significant source of vibration. Ground-borne vibration and noise levels from buses under the BRT Alternative are expected to be well below the ambient background and are, therefore, not expected to exceed the FTA or the WMATA impact criteria anywhere in the study area.




Source: *Transit Noise and Vibration Impact Assessment - Final Report*, Federal Transit Administration, Washington, DC, April 1995

WMATA Blue Line data collected by Capital Transit Consultants (2001).

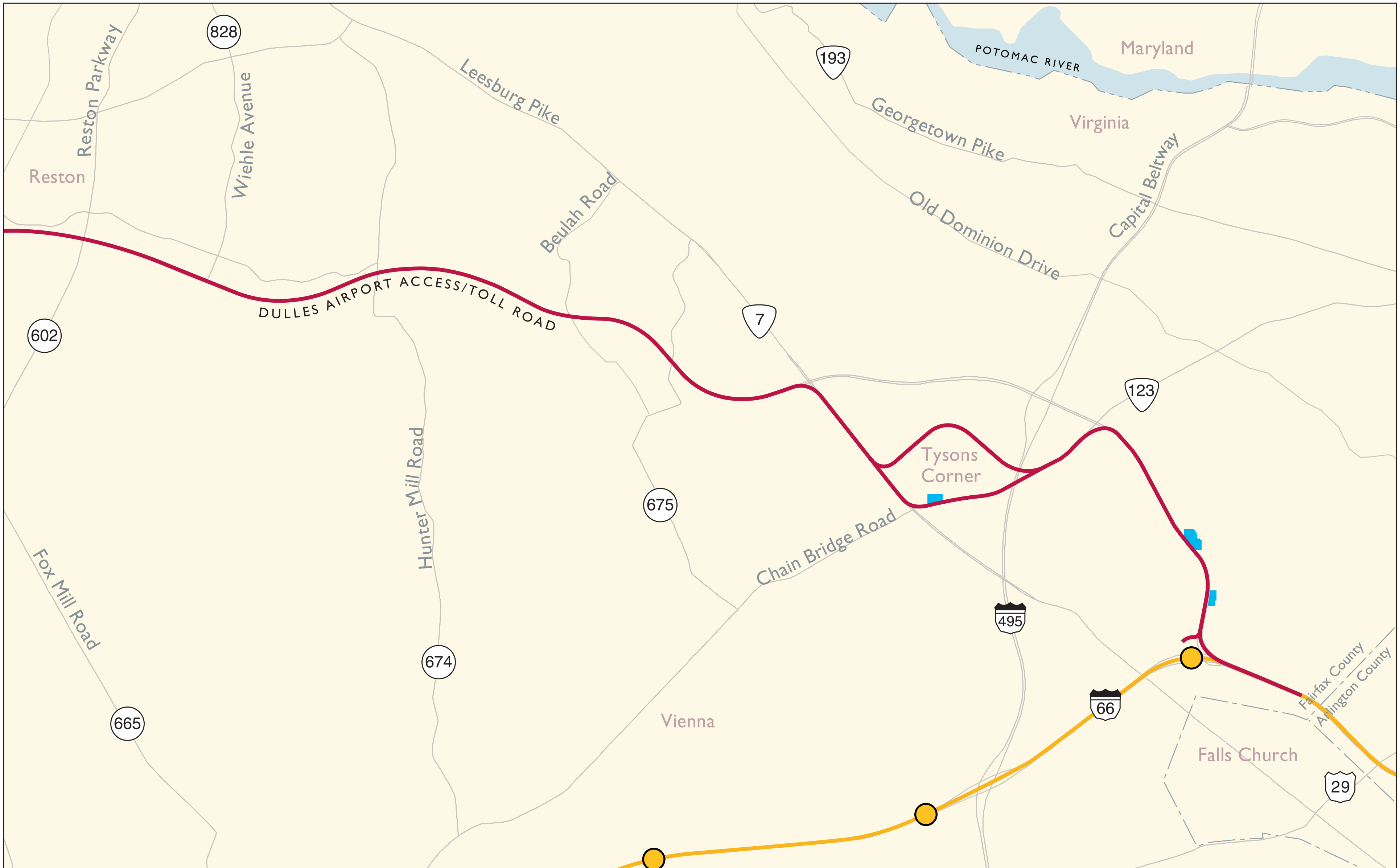
Figure 4.8-2

## FTA Generalized Ground Surface Vibration Curves

Dulles Corridor
Rapid Transit Project

Figure 4.8-3

# Potential FTA/WMATA Vibration & Ground-Borne Noise Impact Locations




LEGEND

- Potential Impacts
- Proposed Metrorail Alignment
- Existing Metrorail Orange Line and Station
- County Boundary

0 3000 6000 Feet

Dulles Corridor
Rapid Transit Project

#### 4.8.5.3 Metrorail Alternative

The results of the vibration and ground-borne noise assessment for the Metrorail Alternative are described in the following sections.

##### Federal Criteria

Under the Metrorail Alternative, new continuously welded rail track is proposed from the Orange Line to Loudoun County. Except for underground segments in Tysons Corner (Alignments T1, T6, T9, and T9 Design Option) and at Dulles Airport, most of the track alignment would be at grade in the median of a roadway, or elevated to accommodate the existing roadways and cross streets. In general, elevated track provides additional attenuation from train passbys due to the mass of the track structure itself, as well as the extra distance that the vibration must travel between the source and the receptor. New at-grade track is proposed along the median of the DAAR in the mid-corridor and the Dulles Greenway in Loudoun County.

Predicted vibration levels are expected to be well below the FTA for frequent events impact criteria at most of the FTA Land Use Category 1, 2, or 3 receptors identified in the study area. For example, predicted vibration levels from Metrorail passbys are expected to range from 16 VdB at the Filene Center at Wolf Trap Farm Park to 62 VdB at the Ernst and Young building in Tysons Corner. Both of these levels are below the FTA impact criteria of 65 and 75 VdB, respectively. However, due to the location of switches and crossovers, vibration levels from Metrorail passbys are predicted to exceed the FTA Land Use Category 2 impact criteria at up to three residences in the Orange Line Connection area. No exceedances of FTA Land Use Categories 1 and 3 are predicted anywhere under the Metrorail Alternative.

Similarly, maximum ground-borne noise levels due to Metrorail passbys are expected to range from less than 10 dBA at a residence in Herndon to 27 dBA at the Ernst and Young building in Tysons Corner. Ground-borne noise levels are predicted to exceed the FTA Land Use Category 2 impact criteria at up to 11 residences located adjacent to track switches (nine of these impacts occur in the Orange Line Connection area west of the Dulles Connector Road, and two occur in Tysons Corner along the north side of Route 123). Two additional exceedances are also predicted in Tysons Corner under the Alignment T9 Design Option. There are no exceedances of FTA Land Use Categories 1 and 3 impact criteria predicted anywhere under the Metrorail Alternative.

##### WMATA Criteria

The same passby ground-borne vibration and noise levels used to assess impact according to the FTA criteria were also used to assess impacts using the WMATA criteria. Up to 11 exceedances of the WMATA vibration design criteria are predicted under the Metrorail Alternative (nine of these impacts occur along the Orange Line Connection west of the Dulles Connector Road, and two occur in Tysons Corner along the north side of Route 123). Two additional exceedances are also predicted in Tysons Corner under the Alignment T9 Design Option. Similarly, ground-borne noise levels are also predicted to exceed the WMATA criteria at nine receptor locations in the Orange Line Connection area.

##### Project Facilities

Ground-borne vibration and ground-borne noise levels from activities at project facilities, such as the Metrorail S&I Yard, are expected to be well below the ambient background levels. Therefore, no exceedances of the FTA or the WMATA impact criteria are expected at project facilities under the Metrorail Alternative.

### Historic Resources

Vibration levels from Metrorail passbys near historic resources are predicted to range from under 15 VdB at the Wiehle/Sunset Hills Historic District in Reston to 44 VdB at The Plantation (part of the Wolf Trap Farm Park Complex) in Vienna. These levels are all well below the FTA Land Use Category 1, 2, and 3 impact criteria. Similarly, ground-borne noise levels at historic resources are also not predicted to exceed the FTA Land Use Categories 1, 2, or 3 impact criteria under the Metrorail Alternative. All of the predicted vibration levels are well below the threshold for minor cosmetic damage of 95 VdB.

## 4.8.5.4 BRT/Metrorail Alternative

The results of the vibration and ground-borne noise assessment are described in the following subsections.

### Federal Criteria

The Metrorail alignments along the Orange Line Connection and the Tysons Corner areas would be the same as under the Metrorail Alternative. The balance of the project corridor would be served with BRT service and the same effects as the BRT Alternative would apply.

As a result, predicted vibration levels are expected to be well below the FTA impact criteria for frequent events (i.e., greater than 70 operations per day) at most of the FTA Land Use Category 1, 2, or 3 receptors identified in the study area. For example, predicted vibration levels from Metrorail passbys are expected to range from well below the ambient background at the Filene Center at Wolf Trap Farm Park to 62 VdB at the Ernst and Young office building in Tysons Corner. Both of these levels are below the FTA impact criteria of 65 and 75 VdB, respectively. However, due to the location of switches and crossovers, vibration levels from Metrorail passbys are predicted to exceed the FTA Land Use Category 2 impact criteria at up to three residence in the Orange Line Connection area. No exceedances of FTA Land Use Categories 1 and 3 are predicted anywhere under the BRT/Metrorail Alternative.

Similarly, maximum ground-borne noise levels due to Metrorail passbys are expected to range up to a peak of 27 dBA at the Ernst and Young office building in Tysons Corner. Ground-borne noise levels are predicted to exceed the FTA Land Use Category 1 impact criteria at up to 11 residences located adjacent to track switches in the same areas described above under the discussion of Metrorail impacts (nine in the Orange Line Connection west of the Dulles Connector Road and two in Tysons Corner along the north side of Route 123). There are no exceedances of FTA Land use Categories 1 and 3 impact criteria predicted anywhere under the BRT/Metrorail Alternative.

### WMATA Criteria

The same passby ground-borne vibration and noise levels used to assess impact according to the FTA criteria were also used to assess impact using the WMATA criteria. Up to 11 exceedances of the WMATA vibration design criteria are predicted in the Metrorail portion of the BRT/Metrorail Alternative at the same location described above under Metrorail impacts (nine along the Orange Line Connection west of the Dulles Connector Road and two in Tysons Corner along the north side of Route 123). Similarly, ground-borne noise levels are also predicted to exceed the WMATA criteria at nine receptor locations in the Orange Line Connection.

### Project Facilities

Ground-borne vibration and ground-borne noise levels from activities at project facilities, such as the BRT Maintenance and Storage Facility, are expected to be well below the ambient background levels. Therefore, no exceedances of the FTA or the WMATA impact criteria are expected under the BRT/Metrorail Alternative.

**Historic Resources**

Vibration levels from Metrorail passbys at historic resources are predicted to be well below the background levels. As a result, maximum vibration and ground-borne noise levels at historic resources are not predicted to exceed the FTA Land use Categories 1, 2, or 3 impact criteria under the BRT/Metrorail Alternative. All of the predicted vibration levels are also well below the threshold for minor cosmetic damage of 95 VdB.

#### 4.8.5.5 Phased Implementation Alternative

Under the Phased Implementation Alternative, the vibration effects would be identical to the Metrorail Alternative. No additional effects are anticipated as a result of first implementing BRT service in the study area.

### 4.8.6 CONSTRUCTION EFFECTS

Similar to noise, vibration levels from construction activities in the study area could also create a nuisance condition at nearby sensitive receptors. In addition to a nuisance condition, the potential for minor structural damage was also analyzed. Based on the vibration-monitoring program, average ground propagation characteristics were assumed as part of the vibration modeling assessment. Vibration levels were determined for the same scenarios selected for the noise assessment including track-laying, and station, bridge, parking garage, and rail/bus yard construction. The following subsections describe the results of the construction impact assessment in the study area.

#### 4.8.6.1 Baseline Alternative

No construction activities are proposed as part of the Dulles Corridor Rapid Transit Project under the Baseline Alternative. Furthermore, because the FTA guidelines do not require a modeling impact assessment for the Baseline Alternative, a construction impact assessment was not conducted.

#### 4.8.6.2 BRT Alternative

Vibration impacts from proposed construction activities, although preliminary, are discussed for the BRT Alternative in the following subsections using the FTA and the WMATA impact criteria.

**Federal Criteria**

Unlike noise levels, which are assessed using a cumulative exposure, vibration is event-based where the focus is on noticeability and damage. Typical activities under the BRT Alternative include station, parking garage, and BRT maintenance facility construction. Maximum RMS vibration levels from parking and maintenance facility construction activities are expected to range from less than 20 VdB at residences in McLean to 60 VdB at Moore Cadillac in Tysons Corner, directly opposite the Tysons West Park-and-Ride. These levels are well below the FTA impact criteria of 72 and 75 VdB for residential and commercial receptors, respectively. The predicted vibration levels for construction activities under the BRT Alternative are also well below the threshold for minor cosmetic damage of 95 VdB.

The distance at which an exceedance of the FTA criteria is predicted for stations, feeder bus facilities, and the BRT maintenance and storage facility ranges from 133 feet for commercial receptors, to 187 feet for residential receptors, to 420 feet for serene parks such as the Wolf Trap Center. No exceedances of the FTA Land Use Categories 1, 2, or 3 impact criteria are predicted at any receptors in the study area.

#### WMATA Criteria

Unlike the FTA impact criteria, the WMATA design criteria assess annoyance and damage from construction activities using only the PPV levels. The distance at which an exceedance of the WMATA criteria is predicted for stations, feeder bus facilities, and the BRT Maintenance and Storage Facility ranges from 29 feet to 97 feet for the closest occupied receptor. Exceedances of the WMATA vibration criteria are predicted at one commercial receptor and two residences during station construction. No exceedances of the WMATA annoyance or damage criteria are predicted at any residences in the study area under the BRT Alternative.

### 4.8.6.3 Metrorail Alternative

Noise impacts from proposed construction activities, although preliminary, are discussed for the Metrorail Alternative in the following subsections using the FTA and the WMATA impact criteria.

#### Federal Criteria

Under the Metrorail Alternative, passenger stations would be constructed to accommodate full Metrorail service in Tysons Corner and Loudoun County. Additionally, both at-grade and aerial track construction would occur from the Orange Line Connection through Loudoun County. Maximum RMS vibration levels from track laying construction activities are expected to range from less than 54 VdB at residences in Loudoun County to 74 VdB at the Rotonda condominium building to 77 VdB at the Ernst and Young office building in Tysons Corner. Although most of these levels are well below the FTA impact criteria, several exceedances of the FTA residential (72 VdB) and commercial (75 VdB) impact criteria are predicted. However, all the predicted vibration levels from construction activities under the Metrorail Alternative are well below the threshold for minor cosmetic damage of 95 VdB.

Exceedances of the FTA vibration RMS criteria are predicted at 34 residences under Alignments T1 and T6, 32 residences under Alignment T9, and up to 40 under Alignment T4 during track construction. Two additional exceedances are also predicted in Tysons Corner under Alignment T9 Design Option. No exceedances of the FTA impact criteria of 65 VdB at serene parks are predicted at any receptors in the study area.

#### WMATA Criteria

The distance at which an exceedance of the WMATA criteria is predicted ranges from 21 feet for bridge construction to 70 feet for intermittent construction activity. Exceedances of the WMATA vibration criteria are predicted at up to ten residences under Alignments T1. Similarly, vibration exceedances are predicted at 10 residences under Alignments T6 and T9, and only nine under Alignment T4 during track laying. No exceedances of the WMATA damage criteria of 0.20 ips are predicted at any receptors in the study area.

### 4.8.6.4 BRT/Metrorail Alternative

Vibration impacts from proposed construction of the BRT/Metrorail Alternative would be similar to those under the BRT (between Tysons Corner and Loudoun County) and Metrorail alternatives (through Tysons Corner).

### 4.8.6.5 Phased Implementation Alternative

Construction of this alternative would involve the implementation of BRT and Metrorail over an extended period of time. Although the construction effects would be the same as those described above for the other three alternatives, the timing would be different. The effects of constructing Metrorail through Tysons Corner would be in addition to the effects of constructing BRT between the Orange Line and Loudoun County. These effects would then be followed by the effects of constructing Metrorail from Tysons Corner to the end of

the study area in Loudoun County. Additional construction activities under the phased implementation of the Metrorail Alternative would include the demolition of the BRT ramps at the Tysons West Station. No construction or demolition vibration impacts exceeding FTA or WMATA criteria are predicted.

### 4.8.7 MITIGATION

Available mitigation measures to reduce the onset of vibration impacts along the Dulles Corridor from operations and construction activities are described in the following subsections.

#### 4.8.7.1 BRT Alternative

No exceedances of the FTA or WMATA impact criteria are expected anywhere from BRT operations. Therefore, no mitigation measures are currently recommended.

Because of the potential for adverse noise impacts during construction, a more detailed assessment and mitigation measures should be evaluated during project final design when the details of the construction staging and equipment use are better defined. The following candidate mitigation measures are available to eliminate or minimize vibration effects in the study area during construction:

- Utilizing alternative construction methods including avoiding impact pile driving near vibration-sensitive receptors, such as residences, schools, and hospitals. Whenever possible, use of drilled piles or sonic/vibratory pile drivers to reduce excessive vibration is recommended.
- Re-routing truck traffic away from vibration-sensitive receptors; and,
- Using Best Available Control Technologies (BACT) to limit excessive vibration further.

#### 4.8.7.2 Metrorail Alternative

Exceedances of the FTA and the WMATA vibration impact criteria are predicted along the Orange Line Connection and in Tysons Corner from Metrorail passbys. The impacts are predicted at residences directly adjacent to switches that result in elevated vibration and ground-borne noise levels from Metrorail train passbys.

Several mitigation measures are available to eliminate the predicted impacts including:

- Operating limitations such as speed reductions over the switches;
- Strategic placement of switches and crossovers away from vibration-sensitive receptors; and,
- The use of vibration dampening materials, such as ballast mats, under each switch.

The same construction mitigation measures described in Section 4.8.8.1 are also available for the Metrorail Alternative.

#### 4.8.7.3 BRT/Metrorail Alternative

The same mitigation measures described in Sections 4.8.8.1 and 4.8.8.2 are also available for the BRT/Metrorail Alternative.

#### 4.8.7.4 Phased Implementation Alternative

The same mitigation measures described in Sections 4.8.7.1 and 4.8.7.2 are also available for the Phased Implementation Alternative.

### 4.8.8 SUMMARY OF EFFECTS

A summary of vibration effects is presented in Table 4.8-5. Figure 4.8-3 shows the locations of the vibration effects.

**Table 4.8-5: Summary of Vibration Effects**

| Alternative | Federal Criteria Exceedances | WMATA Criteria Exceedances | Mitigation |
|---|---|---|---|
| Baseline | None | None | None |
| BRT | None | None | None |
| Metrorail | Up to 16 | Up to 22 | Speed reduction over switches; Strategic placement of switches; Vibration dampening |
| BRT/Metrorail | Up to 14 | Up to 20 | Speed reduction over switches; Strategic placement of switches; Vibration dampening |
| Phased Implementation | Up to 16 | Up to 22 | Speed reduction over switches; Strategic placement of switches; Vibration dampening |

## 4.9 HAZARDOUS AND CONTAMINATED MATERIALS

This section describes the potential for discovering hazardous or contaminated materials during implementation of the project and presents a summary of the recommendations to determine the extent of any suspected contamination and available mitigation measures.

A hazardous and contaminated materials evaluation was completed in the spring of 2001 for the Baseline and the four Build Alternatives. The results of the study are summarized in this section and documented in detail in the *Hazardous and Contaminated Materials Technical Report* (June 2002). The hazardous materials evaluation was conducted in accordance with the scope and limitations of the American Society for Testing and Materials (ASTM) Standard for Environmental Site Assessments: Phase I Environmental Site Assessment Process (E-1527-00).

### 4.9.1 METHODOLOGY

The principal objective of the hazardous materials evaluation was to identify recognized environmental conditions in the Dulles Corridor. According to the ASTM Standard, a recognized environmental condition (REC) is defined as the presence or likely presence of any hazardous substance or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release into structures on the property or into the ground, groundwater, or surface water of the property. To identify recognized environmental conditions, a Phase I Environmental Site Assessment was completed for the study area.

The study area for hazardous and contaminated materials was determined as a 600-foot wide corridor that included the Dulles Connector Road, DAAR and Dulles Toll Road, and Dulles Greenway, expanded to widths

of 800 to 2,000 feet depending on the proposed facilities. The study area was delineated based on the potential for disturbance from all conceivable project facilities.

A Phase I assessment is intended to permit a user to satisfy one of the requirements to qualify for the innocent landowner defense to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA, commonly known as Superfund) liability; that is, the practices that constitute "all appropriate inquiry into the previous ownership and uses of the property consistent with good commercial or customary practice." Recognized environmental conditions within the study area were identified by 1) reviewing regulatory agency databases, 2) consulting with state and local environmental management agencies, and 3) conducting a field investigation of the Dulles Corridor and surrounding areas. More specifically, the evaluation consisted of the following:

- Review of regulatory database files;
- Review of VDEQ files to obtain more detailed information regarding spills, violations, contamination, and status of remediation activities reported in database files within the search distances specified in the ASTM standard (e.g. the study area);
- Review of publications, maps, and reports about the surficial natural features of the study area prepared by the USGS, Northern Virginia Soil and Water Conservation District, and the Loudoun County office of the Natural Resources Conservation Service (NRCS);
- Evaluation of historical aerial photographs of the area surrounding the proposed alignments, dated 1957 and 1962, 1967, 1974, 1981, and 1991, and historical topographic maps dated from 1956 to 1994; and
- Conducting field surveys and site visits to verify the hazardous materials and petroleum contamination sites listed in the database files, and to identify any additional sites, focusing on properties with the potential to contain underground storage tanks (USTs), petroleum contamination, and/or hazardous materials use, storage, or disposal.

The study area for these activities is defined by the ASTM Standard. The standard identifies specified search distances for the various regulatory agency databases, historic aerial photographs, and historic maps. These distances were measured from the LOD for the proposed improvements. The field reconnaissance was also conducted within these distances.

The hazardous and contaminated materials evaluation identified known and potentially hazardous material and petroleum-contaminated sites along the Dulles Corridor, evaluated potential impacts from the proposed project, and provided recommendations for additional investigations where required.

### 4.9.2 EXISTING CONDITIONS

This section describes the data collection effort and field reconnaissance conducted by the project team to identify sites of potential concern with respect to the various alignments for the Build Alternatives. After these activities were conducted, the sites with recognized environmental conditions were narrowed to a list containing only sites of potential concern.

#### 4.9.2.1 Data Collection

A variety of data sources were used to identify sites with recognized environmental conditions. Data collection involved review of regulatory agency databases, historic aerials, and topographic maps.

Available government agency databases were reviewed to determine whether hazardous materials-related activities within or near the Dulles Corridor could potentially threaten the environmental quality of the study area and adjacent properties. The current and past regulatory status of the sites within the Dulles Corridor was determined by review of information on file with EPA, VDEQ, and the Nuclear Regulatory Commission. The records search performed by Environmental Data Resources, Inc. (EDR) was reviewed for the entire Dulles Corridor. The executive summary of the EDR report is presented in the *Hazardous and Contaminated Materials Technical Report* (June 2002).

For this study, EDR compiled a detailed list of sites with potential for RECs within specified search distances. All of the search distances in the EDR records search were based on the ASTM Standard except for the Tysons Corner area, Dulles Airport, and Metrorail S&I Yard Sites 15 and 20. In the Tysons Corner area, the database search was expanded to include a triangular area with the DAAR and Dulles Toll Road as the northern boundary, Route 123 and I-495 as the eastern boundary, and Route 7 as the western boundary. The database search area for Dulles Airport was also expanded to include the entire airport property. Due to the proximity of Sites 15 and 20, a location between the two rail yards, the intersection of Mercure Circle and Quicksilver Drive, was chosen. The search extended two miles from this location.

Table 4.9-1 lists the databases included in the EDR search, the corresponding ASTM search distances, and the number of sites identified in the study area. Not all sites with RECs are listed in regulatory agency databases. For this reason, coordination with agencies, review of historic information, and field reconnaissance were also conducted.

Historic land use information for the Dulles Corridor and adjoining properties was documented by a review of historic topographic maps and historic aerial photographs. The historic maps and aerial photographs were reviewed to identify past recognized environmental conditions and utility structures that might potentially affect current use of the property in the Dulles Corridor. A detailed list of the topographic maps and aerial photographs reviewed is contained in the *Hazardous and Contaminated Materials Technical Report* (June 2002). No sites with recognized environmental conditions that could affect the study area were identified through these sources.

**Table 4.9-1: Environmental Database Search Results**

| Database[1] | Search Distance (Miles)[2] | Number of Sites Identified |
|---|---|---|
| Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) | 0.50 | 0 |
| Consent Decrees (CONSENT)* | 1.00 | 0 |
| No Further Remedial Action Required (NFRAP) | 0.25 | 0 |
| Records of Decision (RODs)* | 1.00 | 0 |
| National Priority List (NPL) | 1.00 | 0 |
| Resource Conservation and Recovery Act Information System (RCRIS) | | |
| Large Quantity Generators (LQG) | 0.25 | 5 |
| Small Quantity Generators (SQG) | 0.25 | 64 |
| Treatment, Storage, and Disposal (TSD) facilities | 0.50 | 0 |
| Corrective Action Reports (CORRACTS) | 1.00 | 0 |
| Emergency Response Notification System (ERNS) | TP | 6 |
| State Hazardous Waste Sites (SHWS) | 1.00 | 0 |
| Solid Waste Facilities/Landfill Sites (SWF/LF) | 0.50 | 0 |

| Database[1] | Search Distance (Miles)[2] | Number of Sites Identified |
|---|---|---|
| Storage Tanks | | |
| Underground Storage Tanks (UST) | 0.25 | 131 |
| Leaking Underground Storage Tanks (LUST) | 0.50 | 79 |
| Aboveground Storage Tanks (AST)** | TP | 7 |
| Facility Index System (FINDS)* | TP | 89 |
| Materials Licensing Tracking System (MLTS)* | TP | 4 |
| Virginia Voluntary Remediation Program (VRP) | 0.50 | 1 |
| Virginia Comprehensive Environmental Data System (CEDS)** | TP | 6 |
| Virginia Pollution Complaint Database (SPILLS)** | TP | 0 |
| Toxic Substances Control Act (TSCA)* | TP | 0 |
| Toxic Chemical Release Inventory (TRIS)* | TP | 0 |
| Hazardous Materials Information Reporting (HMIRS)* | TP | 0 |
| PCB Activity Database System (PADS)* | TP | 2 |
| Biennial Reporting System (BRS) | 1.0 | 0 |
| Mines Master Index File (MINES)* | 0.25 | 0 |
| RCRA Administrative Action Tracking System (RAATS)* | TP | 0 |
| Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)/Toxic Substances Control Act (TSCA) Tracking System (FTTS) | 1.0 | 1 |
| Former Manufactured Coal Gas Sites (Coal Gas)*** | 1.0 | 0 |
| Oil/Gas Pipelines/Electrical Transmission Lines *** | 1.0 | 0 |
| Virginia Public Water Supply (PWS) Wells *** | 1.0 | 5 |

1 Detailed descriptions of the databases are provided in the *Hazardous and Contaminated Materials Technical Report* (June 2002)
2 Search distance from centerline of Dulles Corridor, search distance required by ASTM standard.
TP = Target Property, which includes sites within study area boundary only
*Federal ASTM supplemental database
**State and local ASTM supplemental database
***EDR proprietary database

#### 4.9.2.2 Field Reconnaissance

The project team conducted field reconnaissance between February 2001 and February 2002 to confirm the existence of all reported sites and additional sites identified during the review of historic information. Due to the extensive number of sites within the study area and the preliminary nature of this investigation, a windshield survey was conducted.

Individual site inspections or interviews with property owners to confirm the existence of the recognized environmental conditions identified for their properties were not conducted as part of this evaluation.

During the reconnaissance, several facilities were identified within the study area that were not listed in the EDR reports, but based on professional judgment, are likely to contain RECs. Thirty-four additional sites of potential concern were identified and included gasoline stations, automobile dealerships, and areas with visible debris and garbage piles.

#### 4.9.2.3 Sites of Potential Concern

A total of 234 sites of potential concern were identified for the study area. Not all of the sites identified on the EDR report were considered sites of potential concern. Some sites no longer exist and/or could not be identified in the field. After reviewing the locations of these sites in relation to each of the Build Alternatives

and the approximate limits of disturbance (LOD) for each, the list was narrowed to those identified in Table 4.9-2 and Figure 4.9-1.

The 234 sites with potential for RECs were evaluated to determine which ones would pose a risk to the alternatives being considered. Based on this evaluation, 28 of the 234 sites were determined to be a potential concern. These sites and the types of contamination that could be present at each site are identified in Table 4.9-2.

**Table 4.9-2: Environmental Sites of Potential Concern**

| Site No. | Site Name[1] | Address | EDR Database/Status |
|---|---|---|---|
| 3 | WMATA S&I Yard | 7251B & 7305 Idylwood Road | RCRIS-SQG - No violations reported<br>FINDS<br>LUST - Investigation closed 12/10/93<br>UST - 3 Active, 2 Removed |
| 16 | Westgate Building | 1600 Anderson Road | LUST - Investigation closed 3-13-00<br>UST - Active |
| 26 | Getronics | 7900 Westpark Drive | UST - Active |
| 32 | Former Getronics Building | 7916 Westpark Drive | LUST - Investigation closed 9/16/97<br>UST - Removed |
| 35 | MCI Telecommunications | 8003 Westpark Drive | LUST - Investigation closed 7/2/93<br>UST - 2 Removed<br>AST - Active |
| 66 | Merchants Tire & Auto Center | 8350 Leesburg Pike | RCRIS-SQG - No violations reported<br>FINDS<br>UST - Active |
| 68 | Goodyear Auto Service Center | 8397A Leesburg Pike | RCRIS-SQG - No violations reported<br>FINDS<br>Field ID - Underground Hoists |
| 71 | Best Western Westpark Hotel | 8401 Westpark Drive | UST - Active<br>FINDS |
| 72 | Shell Service Station | 8411 Leesburg Pike | Field ID - Possible USTs |
| 74 | Stohlman VW and Subaru | 8433 Leesburg Pike | LUST - Investigation closed 5/24/95<br>RCRIS-SQG - No violations reported<br>FINDS<br>UST - 2 Active |
| 78 | Rosenthal Nissan, Inc. | 8525 Leesburg Pike | LUST - Investigation closed 1/25/95<br>RCRIS-LQG - No violations reported<br>FINDS<br>UST - 5 Removed |
| 91 | Moore Cadillac Co. | 8595 Leesburg Pike | LUST - Investigation closed 8/26/99<br>UST - 4 Active<br>Field ID - Underground hoists |
| 92 | Security Storage Company of Washington | 8600 Leesburg Pike | LUST - Investigation closed 10/11/94<br>UST - 2 Active |
| 93 | Templeton Oldsmobile, Inc. | 8598 Leesburg Pike | ERNS - Investigation closed 8/24/94<br>LUST - 2 Removed<br>UST - 2 Removed<br>RCRIS-SQG - No violations reported<br>Field ID - Underground hoists |
| 94 | Bodyworks Bodyshop | 8604 Leesburg Pike | Not Listed<br>Underground Hoists |

| Site No. | Site Name[1] | Address | EDR Database/Status |
|---|---|---|---|
| 95 | Koons Toyota/Car Lot | 8610/8602 Leesburg Pike | RCRIS-SQG - No violations reported<br>FINDS<br>LUST - Investigation closed 5-25-93<br>UST - Active |
| 97 | Peacock Buick | 8590 Leesburg Pike | LUST - PC closed 1/8/98 |
| 104 | Sheraton Tysons Corner | 8661 Leesburg Pike | LUST - Investigation closed 8/5/94 |
| 132 | Wiehle Avenue Park-and-Ride | 1860 Wiehle Avenue | UST - Removed |
| 158 | Dyncorp | 2000 Edmund Halley Drive | LUST - Investigation closed 6/12/96<br>UST - Removed |
| 188 | Page AV Jet Corp. | Dulles Airport | RCRIS-SQG - No violations reported<br>FINDS<br>Interview - Active AST |
| 221 | Taxi Cab Pad & Fueling Station | Dulles Airport | UST - Active |
| 208 | Marriott Corporation | 45020 Aviation Drive | UST -2 Active<br>RCRIS-SQG - No Violations<br>FINDS |
| 222 | German Armed Forces Command | 10 Dulles Airport North Service Road | FTTS - Registered with EPA<br>PADS - PCB handler/no violations<br>FINDS<br>UST – Removed |
| 221 | Avis Rent A Car | Dulles Airport North Service Road | UST - 4 Active, 4 Removed |
| 212 | National Car Rental | 400 North Service Road | LUST - Investigation closed 7/2/97<br>UST - 4 Active, 1 Removed |
| 214 | Budget Rent A Car | Dulles Airport North Service Road | RCRIS-SQG - No violations reported<br>FINDS<br>UST - Active<br>LUST - Investigations closed 7/24/95, 2/18/99 |
| 234 | National Oceanic and Atmospheric Administration (NOAA) | Route 606 | RCRIS-SQG – No violations reported<br>FINDS<br>LUST – Investigation closed 3/1/84<br>According to NOAA, there was an unpermitted trench landfill on site. It has been closed. |

1 = Name documented during field reconnaissance; may be different than EDR reported name
Not Listed = Field identified, not on EDR Reports

The majority of these sites are listed as leaking underground storage tanks (LUSTs). Regulatory agency records are sometimes limited in information; therefore, a LUST designation does not confirm the absence or presence of underground storage tanks (USTs). If regulatory agency files reported that contaminated soil and/or groundwater or hazardous materials exist on a site, then this information is included in the table. Where this information is not included, it should be assumed that the existence or extent of contamination is not known. Most of the 28 sites were identified in the EDR reports. A few sites were identified during field reconnaissance, and based on professional judgment were determined likely to contain RECs. In addition, not all sites with RECs are listed in regulatory agency databases. For this reason, coordination with agencies, review of historic information and a field reconnaissance are conducted. The locations of the sites of potential concern are shown on Figure 4.9-1.

The hazardous and contaminated materials evaluation also identified asbestos-containing soils as a potential hazardous materials concern. Greenstone bedrock is a rock type known to contain naturally occurring fibrous asbestos minerals. Three soil types related to the greenstone bedrock were identified in a portion of the study

area, as discussed in Section 4.1, and shown on Figure 4.1-2. These soils are found in the area to the north, south, and southeast of the DAAR and Dulles Toll Road near Hunter Mill Road.

The findings of the hazardous and contaminated materials evaluation are based on preliminary information only and are not intended to replace more detailed studies such as individual site assessments and subsurface soil and groundwater investigations.

### 4.9.3 LONG-TERM EFFECTS

#### 4.9.3.1 Baseline Alternative

Under the Baseline Alternative, there would be no effects from hazardous materials sites related to the Dulles Corridor Rapid Transit Project. Implementation of the Baseline Alternative could result in impacts to sites having hazardous materials or contamination. Although there could be some long-term effects, the most substantial would be addressed during construction. If contamination is encountered during construction of any of these improvements, then impacts are possible. However, these effects are the responsibility of agencies and jurisdictions implementing the improvements.

#### 4.9.3.2 BRT Alternative

Implementation of the BRT Alternative would result in impacts to some of the sites identified as having hazardous materials or contamination. Although there could be some long-term effects such as long-term remediation of contaminated sites, the most substantial impacts from sites with potential hazardous materials or contamination are short-term effects that would be handled during construction.

Potential long-term effects for the BRT Alternative would include the use, storage, and disposal of hazardous materials and wastes generated at the proposed BRT Maintenance and Storage Facility at Site 14. In addition, the BRT Alternative could include installation of aboveground storage tanks (ASTs) or USTs to fuel and maintain BRT vehicles. All necessary registration and permitting would be obtained for hazardous materials and waste storage and disposal, and installation and use of petroleum storage tanks.

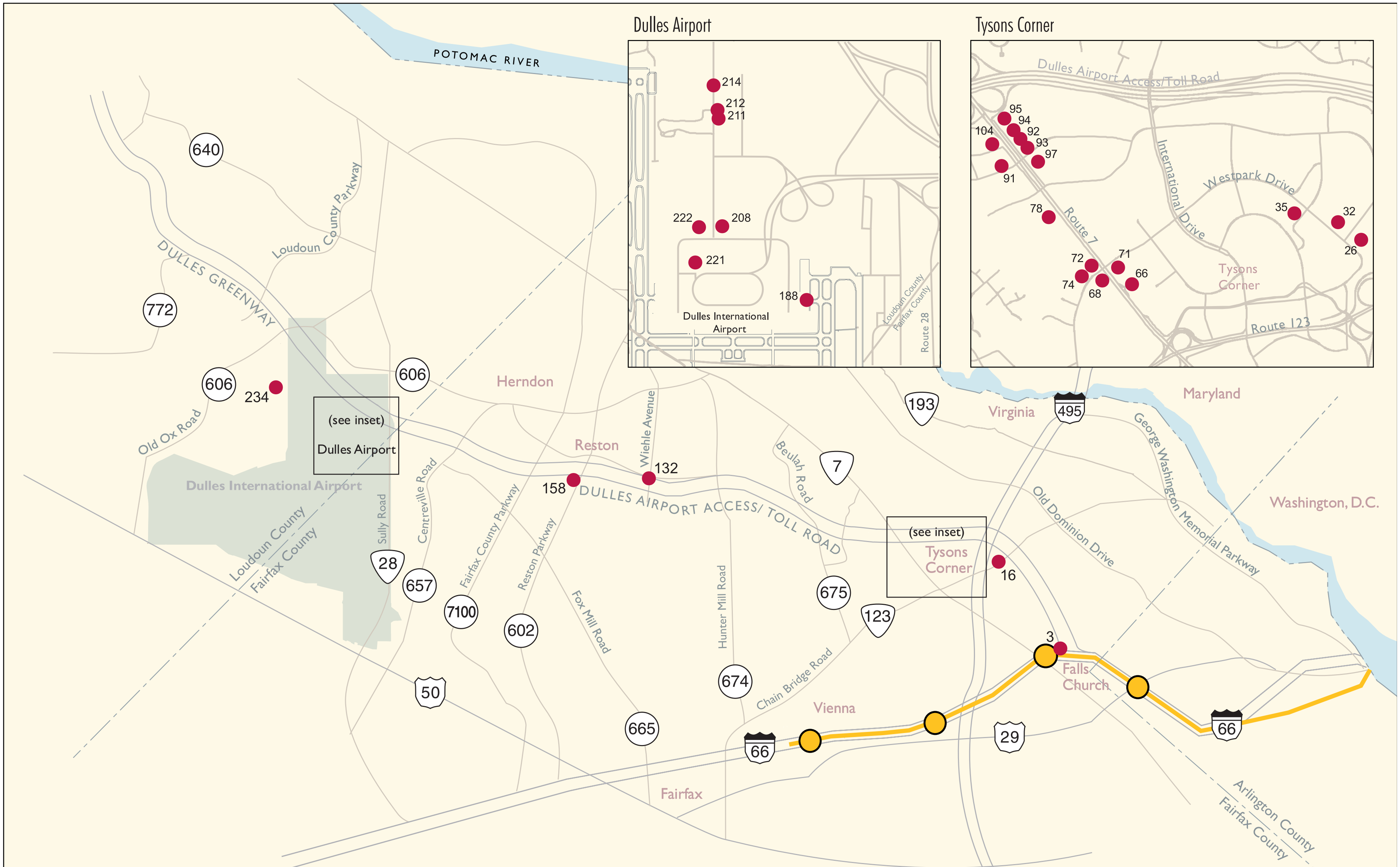
#### 4.9.3.3 Metrorail Alternative

Implementation of the Metrorail Alternative would result in impacts to some of the sites identified as having hazardous materials or contamination. Although there could be some long-term effects such as long-term remediation of contaminated sites, the most substantial impacts from sites with potential hazardous materials or contamination are short-term effects that would be handled during construction.

Under the Metrorail Alternative, S&I Yards (whether site 7, 15, or 20 is selected, and the expanded West Falls Church S&I Yard) would have some long-term effects, which would include the use, storage, and disposal of hazardous materials and waste generated, by the sites. All necessary registration and permitting would be obtained for hazardous materials, waste storage and disposal.

#### 4.9.3.4 BRT/Metrorail Alternative

Implementation of the BRT/Metrorail Alternative would result in impacts to some of the sites identified as having hazardous materials or contamination. Although there could be some long-term effects, such as long-term remediation of contaminated sites, the most substantial impacts from sites with potential hazardous materials or contamination are short-term effects that would be handled during construction.




LEGEND

- Potential Hazardous Waste and Contaminated Material Sites
- County Boundary
- Existing Metro Orange Line and Stations

0 1 2 3 MILES

Figure 4.9-1

# Hazardous Material Sites of Potential Concern

Dulles Corridor
Rapid Transit Project

Potential long-term effects for the BRT/Metrorail Alternative would include the use, storage, and disposal of hazardous materials and wastes generated at the proposed BRT Maintenance and Storage Facility at Site 14. In addition, the BRT/Metrorail Alternative could include installation of ASTs or USTs to fuel and maintain BRT vehicles. All necessary registration and permitting would be obtained for hazardous materials and waste storage and disposal, and installation and use of petroleum storage tanks.

#### 4.9.3.5 Phased Implementation Alternative

Implementation of the Phased Implementation Alternative would result in impacts to some of the sites identified as having hazardous materials or contamination. Although there could be some long-term effects, such as long-term remediation of contaminated sites, the most substantial impacts from sites with potential hazardous materials or contamination are short-term effects that would be handled during construction.

Potential long-term effects for the Phased Implementation Alternative would include the use, storage, and disposal of hazardous materials and wastes generated at the proposed BRT Maintenance and Storage Facility at Site 14. In addition, the Phased Implementation Alternative could include installation of ASTs or USTs to fuel and maintain BRT vehicles. All necessary registration and permitting would be obtained for hazardous materials and waste storage and disposal, and installation and use of petroleum storage tanks.

### 4.9.4 CONSTRUCTION EFFECTS

The presence of soil and/or groundwater contamination, or the existence of hazardous materials within existing or proposed right-of-way, can have an adverse impact on the cost and schedule to complete a transportation project. Contaminated groundwater drawn into the dewatering system during construction could require special treatment and permitting prior to disposal. Contaminated soil unearthed during construction could require treatment and disposal and would not be usable for backfilling excavations. In addition, it could be necessary to notify contractors about contaminated sites if worker exposure to hazardous conditions is possible. Therefore, the early identification of potential contamination sites provides valuable information for the alternatives evaluation, design, right-of-way acquisition, and construction phases.

#### 4.9.4.1 Baseline Alternative

Under the Baseline Alternative, there would be no construction-related effects from hazardous materials from the Dulles Corridor Rapid Transit Project. Implementation of the improvements assumed under the Baseline Alternative could result in impacts to sites having hazardous materials or contamination. Although there could be some long-term effects, the most substantial of which would be addressed during construction. If contamination is encountered during construction of any of these improvements, then impacts are possible. However, these effects are the responsibility of the agencies and jurisdictions implementing the improvements.

#### 4.9.4.2 BRT Alternative

Under the BRT Alternative, the evaluation identified three sites as potential sources of contamination or hazardous materials within the limits of disturbance for the alternative in the Orange Line Connection and Mid-Corridor portions of the study area. Table 4.9-3 lists the three sites.

**Table 4.9-3: Sites of Potential Concern for the BRT Alternative**

| Site No. | Site Name | Address | EDR Database/Status |
|---|---|---|---|
| 3 | WMATA Metrorail Yard | 7251B & 7305 Idylwood Road | RCRIS-SQG<br>FINDS<br>LUST<br>UST |
| 132 | Wiehle Avenue Park-and-Ride | 1860 Wiehle Avenue | UST |
| 158 | Dyncorp | 2000 Edmund Halley Drive | LUST<br>UST |

No sites of potential concerns were identified with respect to the BRT Alternative at Dulles Airport or within Loudoun County, including the BRT Maintenance and Storage Facility proposed for Site 14.

The BRT Alternative would involve additions to the existing West Falls Church S&I Yard (Site No. 3). The adjacent existing Metrorail yard was identified as containing a LUST and several active and removed USTs. The yard is also listed as a small-quantity generator of hazardous waste. Coordination with VDEQ indicated that minimal petroleum contamination occurred as a result of the LUST and that the case is closed. The proposed reconfiguration of the West Falls Church Northside bus facility for BRT and the construction of the Layover and Welfare Facility could result in disturbance of contamination as a result of the past LUST or unknown leaks from USTs.

The station at Wiehle Avenue would involve construction on the parking lot of the Wiehle Avenue Park-and-Ride (Site No. 132). The park-and-ride is associated with an UST that has been removed. In addition, the station facilities at Reston Parkway would be located approximately 100 feet east of Dyncorp (Site No. 158), which is associated with a LUST and a previously removed UST.

Two proposed stormwater ponds would be located near Hunter Mill Road. The soils in this area could contain naturally occurring fibrous asbestos minerals. Construction in these areas could result in exposure to contamination and/or hazardous materials found at these sites.

Construction impacts related to hazardous materials or contamination could result from activities occurring in proximity to generators of those materials, removal or excavation around tanks or underground hoists, and activities occurring in proximity to spill or release sites. Construction activities under the BRT Alternative would require soil disturbance. Although all efforts would be made to identify contaminated sites prior to construction, unknown contaminated soils and/or groundwater could be encountered during construction.

Construction activities can also involve the use of hazardous materials. If these materials are handled, used, or stored improperly, or accidentally spilled, it could result in adverse impacts to both human health and the environment.

#### 4.9.4.3 Metrorail Alternative

As discussed under the BRT Alternative, construction impacts related to hazardous materials or contamination could result from activities occurring in proximity to generators or those materials, removal or excavation around tanks or underground hoists, and activities in proximity to spill or release sites.

The evaluation identified 22 to 28 sites, depending on alignment, as potential sources for contamination or hazardous materials within the limits of disturbance for the Metrorail Alternative. Table 4.9-4 lists these sites.

Under the Metrorail Alternative the following potential impacts were identified within Orange Line Connection, Tysons Corner, Mid-Corridor, Dulles Airport, and Loudoun County.

**Table 4.9-4: Sites of Potential Concern for the Metrorail Alternative**

| Site No. | Site Name | Address | EDR Database/Status |
|---|---|---|---|
| 3 | WMATA S&I Yard | 7251B & 7305 Idylwood Road | RCRIS-SQG<br>FINDS<br>LUST<br>UST |
| 16 | Westgate Building | 1600 Anderson Road | LUST<br>UST |
| 26 | Getronics[*] | 7900 Westpark Drive | UST |
| 32 | Former Getronics Building[*] | 7916 Westpark Drive | LUST<br>UST |
| 35 | MCI Telecommunications[*] | 8003 Westpark Drive | LUST<br>UST<br>AST |
| 66 | Merchants Tire & Auto Center[*] | 8350 Leesburg Pike | RCRIS-SQG<br>FINDS<br>UST |
| 68 | Goodyear Auto Service Center | 8397A Leesburg Pike | RCRIS-SQG<br>FINDS |
| 71 | Best Western Westpark Hotel[1] | 8401 Westpark Dr. | UST<br>FINDS |
| 72 | Shell Service Station | 8411 Leesburg Pike | Not Listed |
| 74 | Stohlman VW and Subaru | 8433 Leesburg Pike | LUST<br>RCRIS-SQG<br>FINDS<br>UST |
| 78 | Rosenthal Nissan, Inc. | 8525 Leesburg Pike | LUST<br>RCRIS-LQG<br>FINDS<br>UST |
| 91 | Moore Cadillac Co. | 8595 Leesburg Pike | LUST<br>UST |
| 92 | Security Storage Company of Washington | 8600 Leesburg Pike | LUST<br>UST |
| 93 | Templeton Oldsmobile, Inc. | 8598 Leesburg Pike | ERNS/LUST<br>UST<br>RCRIS-SQG |
| 94 | Bodyworks Bodyshop | 8604 Leesburg Pike | Not Listed |
| 95 | Koons Toyota/Car Lot | 8610/8602 Leesburg Pike | RCRIS-SQG<br>FINDS<br>LUST<br>UST |
| 97 | Peacock Buick | 8590 Leesburg Pike | LUST |
| 104 | Sheraton Tysons Corner | 8661 Leesburg Pike | LUST |
| 132 | Wiehle Avenue Park-and-Ride | 1860 Wiehle Avenue | UST |

| Site No. | Site Name | Address | EDR Database/Status |
|---|---|---|---|
| 158 | Dyncorp | 2000 Edmund Halley Drive | LUST<br>UST |
| 188 | Page AV Jet Corporation | Dulles Airport | RCRIS-SQG<br>FINDS<br>Interview |
| 221 | Taxi Cab Pad & Fueling Station | Dulles Airport | UST |
| 208 | Marriott Corporation | 45020 Aviation Drive | UST<br>RCRIS-SQG<br>FINDS |
| 222 | German Armed Forces Command | 10 Dulles Airport North Service Road | FTTS<br>PADS<br>FINDS<br>UST |
| 211 | Avis Rent A Car | Dulles Airport North Service Road | UST |
| 212 | National Car Rental | 400 North Service Road | LTANKS<br>UST |
| 214 | Budget Rent A Car | Dulles Airport North Service Road | RCRIS-SQG<br>FINDS<br>UST<br>LUST/LTANKS |
| 234 | U.S. National Weather Service | Route 606 | RCRIS-SQG<br>FINDS<br>LUST – Investigation closed 3-1-94<br>Unpermitted trench landfill |

Not Listed = Field identified, not on EDR Reports
1 Alignment T4 only.
2 Alignments T6, T9, and T4 only.

### Orange Line Connection

The Metrorail Alternative would involve additions to storage tracks at the existing West Falls Church S&I Yard (Site No. 3). The existing S&I Yard was identified as a LUST and several active and removed USTs. The yard is also listed as a small-quantity generator of hazardous waste. Coordination with VDEQ indicated that minimal petroleum contamination occurred as a result of the LUST and that the case is closed. The proposed additions to the Metrorail yard could result in disturbance of contamination as a result of the past LUST or unknown leaks from USTs.

### Tysons Corner

**Alignment T1.** Under the Metrorail Alternative, Alignment T1 would pass near 12 sites identified as sites of potential concern. The alignment would involve the demolition of three sites of potential concern to construct the proposed Tysons West Station: Security Storage Co. of Washington (Site No. 92), Templeton Oldsmobile, Inc. (Site No. 93), and Bodyworks Bodyshop (Site No. 94). The three sites of potential concern were identified as having USTs, LUSTs, and underground hoists, and one was listed as a small-quantity generator of hazardous waste. Contamination could be encountered during construction in these areas from previous leaks or unknown leaks from USTs and underground hoists.

**Alignment T6.** Alignment T6 of the Metrorail Alternative would pass near 13 sites identified as sites of potential concern. The alignment would involve the demolition of three sites of potential concern to construct

the proposed Tysons West Station: Security Storage Co. of Washington (Site No. 92), Templeton Oldsmobile, Inc. (Site No. 93), and Bodyworks Bodyshop (Site No. 94). The three sites of potential concern were identified as having USTs, LUSTs, underground hoists, and one was listed as a small-quantity generator of hazardous waste. Contamination could be encountered during construction in these areas from previous leaks or unknown leaks from USTs and underground hoists. Tunneling to construct the proposed Tysons Central C Station and tracks would involve tunneling through two potential sites of concern, Merchants Tire & Auto Center (Site No. 66) and Shell Service Station (Site No. 72). One site was identified with an active UST and is a small-quantity generator of hazardous waste; the other site is a service station with UTSs. There is potential for substantial impacts related to tunneling at this station. Because the alignment would pass near areas with known soil contamination, soil sampling and analysis would be conducted as part of the construction efforts in this area. Contaminated soils resulting from tunneling would be properly disposed.

**Alignment T9 and T9 Design Option.** The effects of Alignment T9 and T9 Design Option are identical to those presented above for Alignment T6 with the following exception: These alignments require taking the Shell Service Station (Site No. 72), a service station with UTSs. Contamination could be encountered during construction from pervious leaks or unknown leaks from USTs and underground hoists.

**Alignment T4.** Alignment T4 of the Metrorail Alternative would pass near 17 sites identified as sites of potential concern. The alignment would involve the demolition of three sites of potential concern to construct the proposed Tysons West Station: Security Storage Co. of Washington (Site No. 92), Templeton Oldsmobile, Inc. (Site No. 93), and Bodyworks Bodyshop (Site No. 94). The three sites of potential concern were identified as having USTs, LUSTs, and underground hoists, and one was listed as a small-quantity generator of hazardous waste. To construct the proposed Tysons Central C Station (aerial) and alignment would involve taking the Shell Service Station (Site No. 72) and building near Merchants Tire & Auto Center (Site No. 66), two potential sites of concern. One site was identified with an active UST and is a small-quantity generator of hazardous waste; the other site is a service station with UTSs. Contamination could be encountered during construction in these areas from previous leaks or unknown leaks from USTs and underground hoists.

### Mid-Corridor

Effects under the Metrorail Alternative in the Mid-Corridor section would be the same as those detailed under the BRT Alternative.

### Dulles Airport

In the Airport portion of the Metrorail Alternative, the alignment would pass near seven sites identified as sites of potential concern. Several of these sites are associated with ASTs, LUSTs, and USTs. One site is a small-quantity generator of hazardous waste and another is a polychlorinated biphenyl (PCB) handler. For this alternative, the station at Dulles Airport would be underground, and there would be the potential for substantial impacts related to tunneling the underground segment. In addition, airport activities such as deicing, fueling, and maintenance could have resulted in contamination in the areas where the Metrorail alignment would be constructed. Because the alignment would pass near areas with known or suspected soil contamination, soil sampling and analysis would be conducted as part of the construction efforts in this area. Soil sampling would also be conducted during the subsequent subsurface geotechnical investigations. Contaminated soils resulting from tunneling would be disposed of properly.

### S&I Yard

No potential contamination would result from construction of a S&I Yard on Site 7.

The proposed S&I Yard on Site 15 and on Site 20 would involve construction on a parcel located near the National Oceanic and Atmospheric Administration (NOAA) U.S. Weather Service, which is associated with a LUST and a closed unpermitted trench landfill. The DEQ Northern Regional Office closed the NOAA LUST on March 1, 1994 indicating no further remediation was warranted. According to NOAA, remediation was completed for the unpermitted landfill and no hazardous conditions exist. All monitoring wells were closed in January 2002.

#### 4.9.4.4 BRT/Metrorail Alternative

Under the BRT/Metrorail Alternative, construction sites would include those identified above for the BRT Alternative, as well as the construction sites identified above for Tysons Corner, in the Metrorail Alternative (which would vary by alignment option).

#### 4.9.4.5 Phased Implementation Alternative

Under the Phased Implementation Alternative, construction sites would be the same as those identified under the Metrorail Alternative. No additional hazardous materials sites are anticipated to be affected as a result of implementing BRT service first.

### 4.9.5 MITIGATION

For the BRT, Metrorail, BRT/Metrorail, and Phased Implementation alternatives, further investigation is recommended during preliminary engineering and the preparation of the Final EIS to determine the extent of any contamination or hazardous material. To avoid or mitigate potential liability associated with contaminated properties, environmental site assessments of properties to be acquired could be performed. If a property is found to be contaminated or to have hazardous materials, and acquisition of the property is unavoidable, coordination with the facility and regulatory agencies would ensure that construction would not impede site cleanup or exacerbate existing contamination.

For any property acquired or disturbed near the intersection of Hunter Mill Road and DAAR and Dulles Toll Road, an Asbestos Compliance Plan would be prepared and submitted to the Fairfax County Department of Health prior to any construction activities. The Compliance Plan would cover worker safety, air monitoring, construction methods to minimize the disturbance of asbestos-containing soils, the disposal of any removed asbestos-containing soils, and capping of any exposed asbestos-containing soils.

Asbestos and lead-based paint inspections were not performed for this analysis. Prior to demolition of any building, a survey is required by a Virginia licensed asbestos inspector and Virginia licensed lead-based paint inspector. Demolition of buildings involving regulated asbestos and lead-based paint would be carried out using appropriate procedures and disposal practices, including the Federal Lead Exposure in Construction Standard (29 CFR 1926.62), the Virginia Solid Waste Management Regulations, and the National Emission Standard for Hazardous Air Pollutants (NESHAP) (40 CFR 61).

A Hazardous Materials Management Plan would be prepared for the use of any hazardous materials during construction activities. This plan would cover the proper storage, handling, and use of hazardous materials required during construction, as well as emergency response procedures for any hazardous material spills.

### 4.9.6 SUMMARY OF EFFECTS

A summary of the hazardous and contaminated materials effects is presented in Table 4.9-5.

**Table 4.9-5: Summary of Hazardous and Contaminated Materials Effects**

| Alternative | Effects (No. of sites affected) | Mitigation |
|---|---|---|
| Baseline | None | None |
| BRT | Minor (3 to 5 sites) | Further investigation.;<br>Agency coordination.;<br>Hazardous Materials Management Plan. |
| Metrorail | Moderate (22 to 28 sites) | Further investigation;<br>Agency coordination;<br>Hazardous Materials Management Plan. |
| BRT/Metrorail | Moderate (25 to 31 sites) | Further investigation;<br>Agency coordination;<br>Hazardous Materials Management Plan. |
| Phased Implementation | Moderate (25 to 31 sites) | Further investigation;<br>Agency coordination;<br>Hazardous Materials Management Plan. |

## 4.10 ENERGY

This section documents the impact of the project on transportation-related energy consumption in the Dulles Corridor. The methodology used to assess the energy consumption impacts of the project is based on the Federal Highway Administration (FHWA) report entitled *Energy and Transportation Systems*, (July 1983) and the report entitled *Urban Transportation and Energy: The Potential Savings of Different Modes* (December 1977). This analysis was conducted to assess the likelihood of significant increases in energy consumption due to implementing the project.

The energy analysis calculates the direct and indirect energy expenditures that would be associated with the Dulles Corridor Rapid Transit Project. Direct energy involves all energy consumed by vehicle propulsion and is presented in British thermal units (Btus) and Barrels of fuel (Bbls). This energy is a function of volume, speed, distance traveled, vehicle mix, type of rail vehicle, and thermal value of the fuel being used. Indirect energy consumption involves the non-recoverable, one-time energy expenditure that would be used in constructing the physical infrastructure associated with the project.

### 4.10.1 EXISTING CONDITIONS

The Dulles Toll Road, an eight-lane, limited-access facility and now carries about 120,000-vehicle trips daily. The current energy consumption for the corridor is 32,932,661 million Btus (5,678,045 Bbls). Approximately 228,643,361 gallons of fuel are consumed annually in the corridor. Calculated current and future energy consumptions are based on vehicle miles traveled (VMT) estimates for the entire study corridor.

### 4.10.2 LONG-TERM EFFECTS

The long-term effects of the proposed project are based on forecast vehicular and Metrorail traffic volumes, speeds, and corridor lengths. Vehicle mix information was obtained from the MWCOG Urban Vehicle Miles Traveled (VMT) mix for the Maryland-Virginia-Washington, D.C. region. The estimated fuel consumption figures take into account expected future fuel efficiency improvements. Overall, the estimated annual roadway fuel consumption in 2025 for all four of the proposed Build Alternatives would be less than the Baseline

Alternative. Results of the direct energy analysis are discussed below by alternative and summarized in Table 4.10-1.

**Table 4.10-1: 2025 Direct Energy Consumed for Project Alternatives**

| Annual Direct Energy | Alternative | | | | |
|---|---|---|---|---|---|
| | Baseline | BRT | Metrorail | BRT/Metrorail | Phased Implementation |
| Annual Roadway Btus (millions) | 54,427,744 | 54,393,390 | 53,174,966 | 54,233,804 | 53,174,966 |
| Total Roadway Fuel Consumed (gallons) | 377,907,548 | 377,669,418 | 369,208,049 | 376,562,581 | 369,208,049 |
| Percent change from Baseline Alternative | -- | -0.06 | -2.3 | -0.36 | -2.3 |
| Annual Metrorail Btus (millions) | 0 | 0 | 1,205,566 | 483,290 | 1,205,566 |
| Total Annual Btus Consumed (millions) | 54,427,744 | 54,393,390 | 54,380,532 | 54,717,094 | 54,380,532 |
| Total Annual Bbls Consumed | 9,384,094 | 9,378,171 | 9,375,954 | 9,433,982 | 9,375,954 |
| Percent change from Baseline Alternative | -- | -0.06 | -0.09 | 0.53 | -0.09 |

Btus- British thermal units
Bbls- Barrels of fuel

For the BRT Alternative, difference between total VMT of the three alignments was minimal, in all cases less than 1 percent, and direct energy consumption for BRT 3 (Direct) was analyzed as the worst-case representative of all the BRT Alternative. For the BRT/Metrorail and Metrorail alternatives, Tysons Corner Alignment T6 was used in the analysis.

The difference between the four Tysons Corner alignments, in terms of various measures of regional travel demand, is insignificant. Alignment T6, with four stations, represents a worst-case scenario for direct energy consumption.

The indirect energy analysis reflects not only the four proposed Build Alternatives, but also considers the construction differences of the various alignments associated with each alternative. For the BRT Alternative the analysis considers BRT 1, BRT 2 and BRT 3, and for the BRT/Metrorail and Metrorail alternatives, it considers the construction differences associated with the potential Metrorail Alignments (T1, T4, T6 T9, and T9 Design Option) and the various Metrorail S&I yards under study. The energy analysis for the Phased Implementation Alternative assumes that each phase includes and builds on the previous project phase.

#### 4.10.2.1 Baseline Alternative

Any impacts to energy resources that would occur as a result of these existing or committed projects would be the responsibility of the agencies and jurisdictions implementing the improvements. The Baseline Alternative reflects the condition for the corridor without the Dulles Corridor Rapid Transit Project and is used as the basis of comparison for the direct energy consumption associated with the four proposed Build Alternatives. The direct energy estimate for the Baseline Alternative is 54,427,744 million Btus (9,384,094 Bbls). An estimated 377,907,548 gallons of fuel would be consumed annually.

### 4.10.2.2 BRT Alternative

The direct energy estimate for the BRT Alternative is 54,393,390 million Btus (9,378,171 Bbls), slightly lower than the Baseline Alternative. The variation between predicted direct energy estimates of the Baseline Alternative and the BRT Alternative is -0.06 percent. An estimated 377,669,418 gallons of fuel would be consumed annually.

### 4.10.2.3 Metrorail Alternative

The direct energy estimate for the Metrorail Alternative is 53,174,966 million Btus (9,375,954 Bbls), slightly higher than the Baseline Alternative. The variation between predicted direct energy estimates for the Baseline Alternative and the Metrorail Alternative is -0.09 percent. An estimated 369,208,049 gallons of fuel would be consumed annually.

### 4.10.2.4 BRT/Metrorail Alternative

The direct energy estimate for the BRT/Metrorail Alternative is 54,233,804 million Btus (9,433,982 Bbls), slightly lower than the Baseline Alternative. The variation between predicted direct energy estimates of the Baseline Alternative and the BRT/Metrorail Alternative is 0.53 percent. An estimated 376,562,581 gallons of fuel would be consumed annually.

### 4.10.2.5 Phased Implementation Alternative

Phased implementation would result in all of the alternatives discussed above being implemented, beginning with the BRT Alternative, then extending Metrorail service through Tysons Corner (BRT/Metrorail Alternative), and finally extending Metrorail to Loudoun County (Metrorail Alternative). With Phased Implementation, BRT would be built first along the entire Dulles Corridor in 2005. Energy consumption calculations for this phase of the project are based on forecast traffic for 2006. The energy consumption for the BRT Alternative and Baseline Alternative are presented in Table 4.10-2. Total direct energy consumption for the Baseline in 2006 would be approximately 38,337,573 Btus (6,609,926 Bbls). The total direct energy consumption for the BRT Alternative would be approximately 37,862,156 Btus (6,527,958 Bbls). The BRT option would consume approximately 1.2 percent less fuel because there would be fewer vehicles traveling along the corridor.

**Table 4.10-2: Direct Energy Consumption for the 2006 BRT Phase**

| Annual Direct Energy | Alternative | |
|---|---|---|
| | Baseline | BRT |
| Btus Consumed (millions) | 38,337,573 | 37,862,156 |
| Bbls Consumed | 6,609,926 | 6,527,958 |
| Percent change from Baseline Alternative | -- | -1.2 percent |
| Total Roadway Fuel | 266,183,758 | 262,883,078 |
| Percent change from Baseline Alternative | -- | -1.2 percent |

The BRT Alternative would be developed to permit the phased conversion of BRT to Metrorail in 2006. The project would build Metrorail through Tysons Corner and BRT would remain throughout the rest of the corridor. The energy analysis for this project phase was based on forecast traffic for 2006. The BRT/Metrorail Alternative would not significantly affect energy consumption because the annual energy consumption would

be approximately 0.1 percent less than the Baseline Alternative and 0.7 percent less fuel would be utilized on the roadways (see Table 4.10-3).

**Table 4.10-3: Direct Energy Consumption for the 2006 BRT/Metrorail Phase**

| Annual Direct Energy | | Alternative |
|---|---|---|
| | Baseline | BRT/Metrorail |
| Btus Consumed (millions) | 38,337,573 | 38,378,381 |
| Bbls Consumed | 6,609,926 | 6,616,962 |
| Percent change from Baseline Alternative | -- | -0.1 percent |
| Total Roadway Fuel Consumed | 266,183,758 | 264,258,206 |
| Percent change from Baseline Alternative | -- | -0.7 percent |

Phased implementation would culminate in the Metrorail Alternative in 2010. This phase would build Metrorail though the entire corridor including service to Dulles Airport and Loudon County with feeder bus service to Metrorail stations. Additional track would be constructed for the operation of the Metrorail. The Metrorail Alternative would require approximately 0.7 percent more direct energy and the roadways would utilize approximately 1.8 percent less fuel than the Baseline Alternative (See Table 4.10-4).

**Table 4.10-4: Direct Energy Consumption for the 2010 Metrorail Phase**

| Annual Direct Energy | | Alternative |
|---|---|---|
| | Baseline | Metrorail |
| Btus Consumed (millions) | 41,879,452 | 42,196,091 |
| Bbls Consumed | 7,220,595 | 7,275,188 |
| Percent change from Baseline Alternative | -- | 0.7 percent |
| Total Roadway Fuel Consumed | 290,796,239 | 285,421,394 |
| Percent change from Baseline Alternative | -- | -1.8 percent |

### 4.10.3 CONSTRUCTION EFFECTS

Energy consumption associated with construction (indirect energy) was calculated for each of the proposed Build Alternatives and reflects the one-time, non-recoverable energy costs associated with the construction of tracks and modifications to existing roadways. The indirect energy analysis was based on the number of lane-miles and track-miles proposed. This includes construction of surface, tunnel, and elevated roadway and track segments. These figures were then multiplied by construction energy factors which estimate the amount of energy necessary to extract raw materials, manufacture and fabricate construction materials, transport materials to the work site and complete construction activities. Results of the indirect energy analysis are discussed below by alternative.

#### 4.10.3.1 Baseline Alternative

Under the Baseline Alternative, there would be no construction-related effects to energy resources from the Dulles Corridor Rapid Transit Project. However, there could be construction-related effects from the

improvements assumed under this alternative. Identification of those effects is the responsibility of the agencies and jurisdictions implementing the improvements.

#### 4.10.3.2 BRT Alternative

The highest indirect energy consumption associated with the BRT Alternative, as shown in Table 4.10-5, would occur with BRT 1 and would be approximately 159,678 million Btus (27,531 Bbls). The increase in energy consumption associated with BRT 1 is due to the surface roadways being constructed for this alternative. The consumption estimates for all three BRT alignments consider the roadway construction associated with the BRT Alternative.

**Table 4.10-5: Indirect Construction Energy Consumption for the BRT Alternative**

| Annual Energy Consumption | | | Alignment |
|---|---|---|---|
| | BRT 1 | BRT 2 | BRT 3 |
| Btus Consumed (Millions) | 159,678 | 100,666 | 35,546 |
| Bbl Consumed | 27,531 | 17,356 | 6,129 |
| Bbl per Mile | 2,394 | 2,394 | 2,394 |

#### 4.10.3.3 Metrorail Alternative

The highest indirect energy consumption associated with the Metrorail Alternative would occur with Alignment T4 and would be approximately 1,835,176 million Btus (316,410 Bbls), as shown in Table 4.10-6. The increase in energy consumption associated with Alignment T4 would be due in part to the elevated track miles being constructed.

**Table 4.10-6: Indirect Construction Energy Consumption for the Metrorail Alternative**

| Annual Energy Consumption | | | | Alignment |
|---|---|---|---|---|
| | T1 | T4 | T6 | T9 |
| Btus Consumed (Millions) | 1,713,141 | 1,835,176 | 1,743,5228 | 1,667,496 |
| Bbl Consumed | 295,369 | 316,410 | 300,607 | 287,499 |
| Bbl per Mile | 4,689 | 4,792 | 4,799 | 4,597 |

#### 4.10.3.4 BRT/Metrorail Alternative

The highest indirect energy consumption associated with the BRT/Metrorail Alternative, as seen in Table 4.10-7 would occur with Alignment T6 and would be approximately 852,522 million Btus (146,987 Bbls). The increase in energy consumption associated with Alignments T1 and T6 is due in part to the track miles being constructed underground.

#### 4.10.3.5 Phased Implementation Alternative

The indirect energy consumption associated with the Phased Implementation Alternative would be somewhat less than that of the BRT and Metrorail alternatives combined. The indirect energy analysis assumes that each phase includes and builds on the previous phase. The energy consumption associated with Phased Implementation is as follows: 1,872,264 Btus consumed (millions), 322,804 Bbl consumed, and 4,336 Bbl per mile.

**Table 4.10-7: Indirect Construction Energy Consumption for the BRT/Metrorail Alternative**

| Annual Energy Consumption | Alignment | | | |
|---|---|---|---|---|
| | T1 | T4 | T6 | T9 |
| Btus Consumed (Millions) | 822,142 | 796,968 | 852,522 | 781,356 |
| Bbl Consumed | 141,749 | 132,753 | 146,987 | 134,717 |
| Bbl per Mile | 4,917 | 4,646 | 51,162 | 4,690 |

### 4.10.4 MITIGATION

Available mitigation measures include: conservation of energy in facility planning, construction, operation and maintenance; recycling pavements, hardware items (guardrails, signals, tires, right-of-way, and similar equipment); using indigenous plants for landscaping; and applying BMPs in roadway maintenance.

### 4.10.5 SUMMARY OF EFFECTS

A summary of the effects related to energy is presented below in Table 4.10-8.

**Table 4.10-8: Summary of Energy Effects**

| Alternative | Energy Usage (Change from Baseline) | Mitigation |
|---|---|---|
| Baseline | -- | Conservation of energy in facility planning, construction, operation and maintenance; recycling pavements, hardware items (guardrails, signals, tires, right-of-way, and similar equipment); using indigenous plants for landscaping; and applying BMPs in roadway maintenance. |
| BRT | -0.06% | Same as above |
| BRT/Metrorail | -0.09% | Same as above |
| Metrorail | 0.53% | Same as above |
| Phased Implementation | -0.09% | Same as above |

# Economic Effects 5

# 5 ECONOMIC EFFECTS

This chapter presents the effects that each of the alternatives being studied for the Dulles Corridor Rapid Transit Project would be expected to have on the local and regional economy. This includes a determination of the effects of proposed alternatives on employment and tax revenues in Fairfax and Loudoun counties and the Commonwealth of Virginia. This section also describes the potential effects of proposed alternatives on station area development under the planning and design guidelines for Fairfax and Loudoun counties. The sections of this analysis discuss the following topics:

**Section 5.1 Economic Conditions.** This section discusses the economic effects that project expenditures would have on the Fairfax and Loudoun counties and the Commonwealth, in terms of increased real estate tax revenues, employment, and related economic effects.

**Section 5.2 Station Area Development.** This section presents the planning context for each station area. Information on the development character and any potential changes in character are presented.

**Section 5.3 Development Effects.** This section discusses the station area development projected for each alternative being studied, including projections of office, retail, hotel, industrial, institutional, and residential development. Opportunities for joint development at station locations are also discussed.

## 5.1 ECONOMIC CONDITIONS

The economic effects of the project would flow through the local and state economy with direct and indirect effects. Construction and operation activities could generate an expansion in payrolls, a proportional increase in consumer demands, as well as new employment in various industrial sectors and occupational categories.

As documented in Section 3.1, both Fairfax and Loudoun counties are experiencing continued growth in both employment and population. Even in light of the current economic slowdown, this growth is expected to continue until 2025, and the project would provide increased accessibility to both residents and businesses within the Dulles Corridor. New transportation capacity in the corridor could also create competitive advantages for businesses located in the corridor. The Build Alternatives would also provide a critical intermodal connection in the region's transportation system by providing a transit link to Washington Dulles International Airport (Dulles Airport). This connection would help support the airport's future expansion, and help it retain its status as an engine of economic activity in Northern Virginia.

The Build Alternatives are also expected to have positive effects on commercial and residential properties located near transit stations. As described more fully in Section 5.3, the Build Alternatives would contribute to greater economic development by focusing higher-density residential and commercial land uses around the transit stations. Past experience with the Metrorail system has demonstrated that transit investments have had positive effects on the residential and commercial development near the stations. It is expected that new development around station areas in the Dulles Corridor would attract businesses from outside of Fairfax and

Loudoun counties providing net economic benefits. New development activity has already been observed at several of the proposed station areas in the study area.

This section describes the anticipated economic effects of the project. The purpose of this analysis is to assess the regional economic effects that can be attributed to the four Build Alternatives relative to the Baseline Alternative. The categories of economic effects that are measured in this analysis include:

- Output, Earnings and Employment Effects from capital expenditures
- Output, Earnings and Employment Effects from operations and maintenance (O&M) expenditures
- Effects on the Local Tax Base

This analysis focuses on the net effects generated by new resources flowing into the local economy that would result from the implementation of the Build Alternatives. The two affected areas considered in this analysis include Fairfax and Loudoun counties combined and the Commonwealth.

The study area for the economic effects analysis focused on the immediate vicinity of the Dulles Corridor, but necessarily included all effects on all of Fairfax and Loudoun counties in the areas of earnings, employment, and local tax base.

It is assumed that transportation network improvements included in the Baseline Alternative would also be included in the Build Alternatives. As such each of the alternatives (including the Baseline Alternative) would include the same economic effects generated by the baseline transportation improvements. However due to the regional nature of the baseline transportation improvements it is extremely difficult to isolate the effects of these improvements on the two study jurisdictions, in order to compare them to the impacts calculated in this analysis. Therefore, this section focuses only on the additional effects of the Build Alternatives, i.e., the *marginal differences* between the future conditions under the Baseline Alternative and the future conditions under each of the Build Alternatives.

For the Metrorail and BRT/Metrorail alternatives, which feature ranges of capital and operating costs for the various alignments, the set of alignments with the highest capital cost is analyzed (BRT 1 and Alignment T6). Any design variations with lower capital or operating costs would generate lower economic effects.

### 5.1.1 OUTPUT, EARNINGS, AND EMPLOYMENT EFFECTS FROM CAPITAL EXPENDITURES

The construction of the project would affect the state and regional economy. The economic effects of capital expenditures are measured using regional multipliers from the U.S. Department of Commerce, Bureau of Economic Analysis' (BEA) Regional Input-Output Modeling System (RIMS II). These multipliers, which reflect the industrial base of the region, are multiplied by the direct capital expenditures in order to calculate the total effects on regional and state economies.

***Output*** is defined as the total dollar change in output across all industries that result from a $1 change in final demand by the industry corresponding to the multiplier. ***Earnings*** is defined as the total dollar change in the earnings of households employed in all industries that results from a $1 change in final demand by the industry corresponding to the multiplier. ***Employment*** refers to the total change in the number of person-year jobs in all industries that results from a $1 million change in final demand by the industry corresponding to the multiplier.

A person-year job is defined as a job for one person over one year. In other words, a job for one person that had a duration of three years would be defined as three person-year jobs.

#### 5.1.1.1 Construction Phase

The direct effects of construction spending would generate indirect or secondary effects, characterized by the production of output by firms in all industries as they employ more workers to meet increases in demand. This leads to induced effects, as the additional wages and salaries paid to workers lead to higher consumer spending.

The total capital expenditures are divided into three categories:

- General Construction: guideway elements, yards and shops, systems, passenger stations, special conditions, soft costs and contingencies;
- Vehicles: vehicle manufacturing and installation; and
- Right-of-way: all right of way costs.

Table 5.1-1 presents the capital cost distribution and the percent locally procured for each Build Alternative.

**Table 5.1-1: Percentage of Capital Costs that are Locally Procured for the Build Alternatives (in millions, 2001 dollars)**

| Capital Cost Item | | General Construction | Vehicles | Right-of-Way | Total |
|---|---|---|---|---|---|
| BRT Alternative | Total | $319.5 | $84.5 | $39.7 | $443.7 |
| | Percentage Locally Procured | 96% | 5% | 100% | 79% |
| | Amount Locally Procured | $305.5 | $4.23 | $39.7 | $349.4 |
| Metrorail Alternative | Total | $2,047.7 | $392.1 | $133.8 | $2,573.7 |
| | Percentage Locally Procured | 84% | 5% | 100% | 73% |
| | Amount Locally Procured | $1,719.4 | $19.6 | $133.8 | $1,872.8 |
| BRT/Metrorail Alternative | Total | $1,055.4 | $149.9 | $106.8 | $1,312.09 |
| | Percentage Locally Procured | 87% | 5% | 100% | 79% |
| | Amount Locally Procured | $921.3 | $7.5 | $106.8 | $1,035.59 |
| Phased Implementation | Total | $2,217.3 | $433.2 | $136.5 | $2.787.0 |
| | Percentage Locally Procured | 85% | 5% | 100% | 73% |
| | Amount Locally Procured | $1881.4 | $21.6 | $136.5 | $2,039.5 |

This table lists only the *net* capital expenditures for the Build Alternatives, relative to the Baseline Alternative.

For this analysis, it was assumed that the majority of General Construction items (between 84 percent and 96 percent, depending on the build alternative) are procured within the local area. General Construction elements that could be partially procured outside of the state include trackwork, systems, and passenger station components. Vehicles are assumed to be procured out of state with the exception of five percent for final assembly costs. The five percent expended within the region is multiplied by the RIMS II multipliers for Motor

Vehicles and Equipment. Right-of-way expenditures are 100 percent locally procured, as they are used to purchase local real estate within the Dulles Corridor. Therefore the right-of-way costs are multiplied by the RIMS Multiplier for Real Estate.

Table 5.1-2 presents the RIMS multipliers for the three industry sectors being studied, for Fairfax and Loudoun counties and the Commonwealth. For the estimation of effects to Fairfax and Loudoun counties, the RIMS II multipliers for Fairfax County were used because the marginal difference between the two counties is relatively small, and Fairfax County multipliers more accurately reflect the industrial makeup of the affected region.

**Table 5.1-2: Regional and Statewide Effect Multipliers**

| Cost Item | RIMS II Multiplier Category | RIMS Final Demand Multipliers | | |
|---|---|---|---|---|
| | | Output ($) | Earnings ($) | Employment (person-year jobs) |
| Fairfax and Loudoun Counties | | | | |
| Construction Costs | Construction | 1.5221 | 0.2811 | 11.0 |
| Vehicles | Motor Vehicles and Equipment | 1.3161 | 0.133 | 3.9 |
| Right-of-Way | Real Estate | 1.3099 | 0.091 | 4.2 |
| Commonwealth of Virginia | | | | |
| Construction Costs | Construction | 2.2544 | 0.6629 | 25.8 |
| Vehicles | Motor Vehicles and Equipment | 1.954 | 0.3714 | 12.0 |
| Right-of-Way | Real Estate | 1.4114 | 0.1454 | 6.4 |

Source: US Department of Commerce, Bureau of Economic Analysis

The gross total effects on output, earnings and employment are calculated by multiplying the expenditures (in millions of dollars) for each cost item by the percentage procured within the regional/state economy and by the appropriate RIMS multiplier.

#### 5.1.1.2 Funding Sources

In order to isolate the potential economic effects of the project to the region and state, it is necessary to distinguish the new resources that could generate net economic effects to the state and local economies, and the portion that would still flow through the state and local economies with similar economic effects (for example, funds that would be allocated to other transportation construction projects in the region). In this analysis, the resources that generate net economic benefits are referred to as new money. This includes all federal funding and portions of the state and Metropolitan Washington Airports Authority (MWAA) funding that represents new resources flowing into the local economy.

Table 5.1-3 lists the capital cost estimates, distribution of funding sources, as well as regional and state new money estimates for the Build Alternatives. Different funding levels have been committed for the BRT, Metrorail, BRT/Metrorail, and Phased Implementation alternatives by the commonwealth and local funding partners.

The net economic effects on output, earnings, and employment are calculated by multiplying the new money expenditures (in millions of dollars) by the percentage procured within the regional/state economy and by the appropriate final demand multipliers.

**Table 5.1-3: Capital Cost and Funding Sources for Build Alternatives (in millions, 2001 dollars)**

| Build Alternative* | Gross Capital Expenditures | Funding Sources | | | | | "New Money" Net Effects | |
|---|---|---|---|---|---|---|---|---|
| | | Federal Grants | Virginia Funds | Fairfax County | Loudoun County | MWAA | Virginia | Fairfax + Loudoun Counties |
| BRT | $443.7 | $266.2 | $88.7 | $69.2 | $13.3 | $6.2 | $266.2 | $323.2 |
| Metrorail | $2,573.7 | $1,286.8 | $643.4 | $414.4 | $123.5 | $105.5 | $1,286.8 | $1,736.1 |
| BRT/Metrorail | $1,312.1 | $694.3 | $308.9 | $292.0 | $11.5 | $5.4 | $694.3 | $882.9 |
| Phased Implementation | $2,787.0 | $1,435.4 | $677.2 | $434.8 | $128.2 | $111.5 | $1,435.3 | $1.908.5 |

This table lists only the net capital costs and funding sources for the Build Alternatives.

### 5.1.1.3 Summary of Economic Effects of Capital Costs

The gross and net economic effects on output, earnings and employment for both Fairfax and Loudoun counties and the Commonwealth, are presented in the following tables. Table 5.1-4 presents the gross effects for each of the four Build Alternatives.

**Table 5.1-4: Gross Economic Effects of Capital Expenditures for Build Alternatives (in millions, 2001 dollars)**

| Build Alternative* | Gross Capital Expenditures | Percent Locally Procured | Fairfax and Loudoun Counties | | | Virginia | | |
|---|---|---|---|---|---|---|---|---|
| | | | Output ($M) | Earnings ($M) | Employment (person-year jobs) | Output ($M) | Earnings ($M) | Employment (person-year jobs) |
| BRT | $443.7 | 79% | $522.6 | $90.1 | 3,544 | $753.0 | $209.9 | 8,187 |
| Metrorail | $2,573.7 | 73% | $2,818.1 | $498.1 | 19,551 | $4,103.3 | $1,166.5 | 45,451 |
| BRT/Metrorail | $1,312.1 | 79% | $1,552.1 | $269.7 | 10,612 | $2,242.4 | $629.0 | 24,543 |
| Phased Implementation | $2,787.0 | 73% | $3,070.9 | $544.2 | 21,353 | $4,476.4 | $1,275.1 | 49,673 |

This table lists only the net capital costs and economic effects for the Build Alternatives, relative to the Baseline Alternative.

The net total economic effects are calculated by reducing the total capital expenditures by the amount of local/regional funding that would remain in the regional economy in absence of the project. The remaining portion of capital expenditures represents the new money originating outside the counties. The net effects are presented in Table 5.1-5.

The results for each alternative are described more fully in Section 5.1.4.

**Table 5.1-5: Net Economic Effects Of Capital Expenditures for Build Alternatives (in millions, 2001 dollars)**

| Build Alternative* | Fairfax and Loudoun Counties | | | | Virginia | | | |
|---|---|---|---|---|---|---|---|---|
| | New Money Capital Expenditures | Output ($M) | Earnings ($M) | Employment (person-year jobs) | New Money Capital Expenditures | Output ($M) | Earnings ($M) | Employment (person-year jobs) |
| BRT | $323.2 | $380.6 | $65.6 | 2,581 | $266.2 | $451.8 | $125.9 | 4,912 |
| Metrorail | $1,736.1 | $1,901.1 | $336.0 | 13,189 | $1,286.8 | $2,051.6 | $583.3 | 22,726 |
| BRT/Metrorail | $882.9 | $1,044.4 | $181.4 | 7,141 | $694.3 | $1,186.6 | $332.9 | 12,988 |
| Phased Implementation | $1,908.5 | $2,102.9 | $372.6 | 14,623 | $1,435.3 | $2305.3 | $656.7 | 25,582 |

This table lists only the net capital costs and economic effects for the Build Alternatives, relative to the Baseline Alternative.

### 5.1.2 OUTPUT, EARNINGS, AND EMPLOYMENT EFFECTS FROM OPERATIONS & MAINTENANCE EXPENDITURES

Implementation of the project would provide a number of direct, indirect, and induced economic effects as a result of ongoing operations and maintenance expenditures and employment. The projected O&M expenditures for the Build Alternatives include the following components:

- Proposed BRT and Metrorail services operating along the Dulles Airport Access Road and Dulles Connector Road.
- Existing and expanded local and express bus services operating in the corridor as feeders to the existing and proposed BRT and Metrorail alternatives. The bus services include existing services operated by Fairfax and Loudoun counties, and WMATA.

This analysis assumes that funding for operations and maintenance would be procured from local government funds and project-generated funds, including:

- Local Government Funds: WMATA Compact, benefit assessment districts, and/or MWAA participation; and
- Project-Generated Funds: passenger fare revenue, joint development, parking revenues, and advertising and concessions income.

Because these expenses would originate from local sources, there would be no net impacts to the local or Commonwealth economies. In addition, any cost savings in operations that would be realized as a result of the project would be absorbed in other parts of the local bus system, such as expansions in service or reductions in operating subsidies. Therefore, the net economic effects would be minimal.

One potential source of federal funding for maintenance for the Build Alternatives is the Section 5307 Urbanized Area Formula Funds. These grants are applied to preventative maintenance, and could be used after the seventh year of operations. At this time, no Section 5307 funds have been allocated for maintenance for this project, and they are not assumed to be part of the operating funding plan, which is described in more detail in Chapter 8. If federal funds are applied to maintenance activities for the Build Alternatives, they could generate some net economic effects to the local and state economies through increased employment and output.

The estimate of full-time employees required for each of the four Build Alternatives is shown in Table 5.1-6. The increased transit employment would result in positive economic impact to Fairfax and Loudoun counties.

**Table 5.1-6: Total Full-Time Employees by Agency**

| Alternative | Total Employees | Difference from Baseline |
|---|---:|---:|
| Baseline | 8,990 | n.a.[1] |
| BRT | 9,330 | 340 |
| Metrorail | 9,591 | 601 |
| BRT/Metrorail | 9,498 | 508 |
| Phased Implementation | 9,591 | 601 |

1 Not Applicable.

### 5.1.3 TAX REVENUE EFFECTS

Construction of the Build Alternatives would require the purchase of some private land and/or buildings for easements, rights-of-way, parking, and station facilities, thereby removing these properties from the existing local tax base. These effects would be most pronounced in the Tysons Corner area, where the Metrorail alignments would require the purchase of commercial property for facilities and right-of-way. Table 5.1-7 summarizes the total right-of-way/property acquisition costs for the four Build Alternatives. The details of the property acquisition are presented more fully in Section 3.3.

**Table 5.1-7: Expenditures for Right-of-Way and Property Acquisition (in millions, 2001 dollars)***

| Alternative | Fairfax County | Loudoun County |
|---|---:|---:|
| Baseline | $0 | $0 |
| BRT | $37.4 | $2.1 |
| Metrorail | $115.3 | $18.5 |
| BRT/Metrorail | $104.1 | $2.7 |
| Phased Implementation | $117.4 | $19.11 |

* These costs are subject to revision based on limited appraisals, which are currently being prepared.

The annual tax revenue associated with the loss of properties due to right-of-way purchase, displacement and relocation was determined by first identifying the actual properties required for the project under each of the alternatives. The assessed value of these properties was then multiplied by the current real estate tax rates for Fairfax and Loudoun counties. The 2001 tax rate in Fairfax County is $1.23 per $100 of assessed value, and the 2001 tax rate in Loudoun County is $1.08 per $100 of assessed value. In the Commonwealth, all real property, residential and commercial, is assessed at 100 percent of its fair market value.

Table 5.1-8 shows the expected annual tax revenues lost from the acquisition of property for each of the alternatives.

The effects of the Build Alternatives on the tax bases of Fairfax and Loudoun counties are relatively small compared to the tax base in each county. It is not anticipated that property acquisition would have any effect on tax revenues for the Commonwealth. These losses in annual tax revenues would likely be offset by the increased value of properties located near the station areas.

**Table 5.1-8: Annual Real Estate Tax Revenue Effects (in millions, 2001 dollars)**

| Alternative | Fairfax County | Loudoun County | Total |
|---|---:|---:|---:|
| Baseline | $0 | $0 | $0 |
| BRT | $0.46 | $0.03 | $0.49 |
| Metrorail | $1.42 | $0.23 | $1.65 |
| BRT/Metrorail | $1.28 | $0.03 | $1.31 |
| Phased Implementation | $1.44 | $0.24 | $1.68 |

The Build Alternatives are also expected to have positive effects on residential and commercial properties within walking distance at the station areas, and greater tax benefits could be expected to accrue to the counties in the long run. These effects could be amplified by the increased density allowances in the station areas, which are described more fully in Section 5.2. Previous experience has shown that Metrorail increases the scale and quality of development in proximity to Metrorail stations. This can generate greater tax revenues for Fairfax and Loudoun counties.

### 5.1.4 LONG-TERM EFFECTS

The long-term economic effects of the Baseline, BRT, Metrorail, BRT/Metrorail, and Phased Implementation alternatives as well as the effects of implementing these alternatives as part of a phased program are described below.

#### 5.1.4.1 Baseline Alternative

The baseline conditions consist of the future economic conditions (employment, industrial output and regional earnings) that would exist under the Baseline Alternative. The economic analysis focused on the incremental differences between the baseline conditions and conditions with the Build Alternatives. No economic impact assessment was conducted for the Baseline Alternative since impacts associated with the Baseline Alternative projects would be the responsibility of the sponsoring agency.

#### 5.1.4.2 BRT Alternative

The economic effects identified for the BRT Alternative are presented in Table 5.1-9.

**Table 5.1-9: Summary of Economic Effects for BRT Alternative (2001 dollars)**

| Economic Effects | Unit | Fairfax and Loudoun Counties | Commonwealth of Virginia |
|---|---|---|---|
| Capital Expenditures | $ millions | $323.2 | $266.2 |
| Output | $ millions | $380.6 | $451.8 |
| Earnings | $ millions | $65.6 | $125.9 |
| Employment | Person-years of jobs | 2,581 | 4,912 |
| Tax Revenue Effects | $ millions/year | $0.49 | n.a.[1] |
| Transit Employment | Jobs (over baseline) | 340 | 340 |

1 Not Applicable.

Under the BRT Alternative new demand for construction would generate net effects equal to the $323.2 million to Fairfax and Loudoun counties and $266.2 million to the commonwealth. Adding in the direct and induced impacts on the output of other regional firms, the net effect on output would total $380.6 million to Fairfax and Loudoun counties and $451.8 million to the Commonwealth over the construction period. Of this amount, $66 million would be paid to workers as wage and salary earnings for the 2,581 person-years of jobs created in Fairfax and Loudoun counties. Across the state, $125.9 million would be paid to workers in wage and salary earnings for 4,912 person-years of jobs. Because the state captures a greater portion of the multiplied impacts, the statewide impacts exceed the regional or county effects.

In terms of O&M effects, the BRT Alternative will create 9,330 new transit-related jobs in the region, which is 340 more jobs than in the Baseline alternative. While many of these employees will likely live in Fairfax County, Loudoun County, or the Commonwealth of Virginia, it should be assumed that some of these employees would live in other jurisdictions within the region. The negative impacts of the BRT Alternative on tax revenues are relatively small when compared to that of the other alternatives. This is largely because the majority of the alignment is located on publicly owned land in the median of the DAAR.

The site for a BRT Maintenance and Storage Facility, Site 14, is on MWAA property, and thus there are no other planned uses for the land. Depending upon the access chosen for the site, up to two businesses could be acquired, removing them from the local tax base, with minor economic effects.

The overall economic effects of the BRT Alternative are lower than those of the other Build Alternatives, largely because the capital and operating costs are smaller than the other three Build Alternatives. Because the proposed BRT system is designed to provide high-quality rapid transit service to the Dulles Corridor, it is expected that the project would create similar positive effects on property values in the vicinity of the station areas. However the effects are expected to be somewhat lower than the other three Build Alternatives, primarily because of the lower system capacity and the amount of permissible development at the station areas in Fairfax County under a BRT Alternative.

It is important to note that the other BRT alignments being examined in this Draft EIS—BRT 2 and BRT 3—would have lower economic impacts because they have lower capital costs.

#### 5.1.4.3 Metrorail Alternative

The economic effects identified for the Metrorail Alternative are presented in Table 5.1-10.

**Table 5.1-10: Summary of Net Economic Effects for Metrorail Alternative (2001 dollars)**

| Economic Effects | Unit | Fairfax and Loudoun Counties | Commonwealth of Virginia |
|---|---|---:|---:|
| Capital Expenditures | $ millions | $1,736.1 | $1,286.8 |
| Output | $ millions | $1,901.1 | $2,051.6 |
| Earnings | $ millions | $336.0 | $583.3 |
| Employment | Person-years of jobs | 13,189 | 22,726 |
| Tax Revenue Effects | $ millions/year | $1.65 | n.a.[1] |
| Transit Employment | Jobs (over baseline) | 601 | 601 |

1 Not Applicable.

With the Metrorail Alternative, new demand for construction would increase output by $1,901.1 million in Fairfax and Loudoun counties and $2,051.6 million in the Commonwealth over the construction period. Of this amount, $336.0 million would be paid to workers as wage and salary earnings for the 13,189 person-years of jobs created across all industries in Fairfax and Loudoun counties. Statewide, $583.3 million would be paid to workers as wage and salary earnings for the 22,726 person-years of jobs created across all industries.

In terms of O&M effects, the Metrorail Alternative will create 9,591 new transit-related jobs in the region, which is 601 more jobs than in the Baseline Alternative. While many of these employees will likely live in Fairfax County, Loudoun County, or the Commonwealth of Virginia, it should be assumed that some of these employees would live in other jurisdictions within the region. This alternative has the second-highest level of economic benefits because of the higher investments in construction, operations and maintenance. Similarly, the negative impacts of the Metrorail Alternative on the tax base would be greater than those of the BRT Alternative, because the alignment through Tysons Corner would require the acquisition of high-value commercial land. Right-of-way costs for the Metrorail Alternative make up approximately five percent of the total capital costs. However the density allowances at the station areas in the Mid-Corridor section (Wiehle Avenue, Reston Parkway, Herndon-Monroe and the Fairfax County side of Route 28) are higher than those for the BRT and BRT/Metrorail alternatives, and could result in greater economic development effects from development activity and tax revenue benefits in the corridor.

The Metrorail Alternative would require development of land for an S&I Yard. The yard sites are expected to have varying, yet minimal economic impacts. Site 7 is proposed for a planned development that falls within the Transit-Related Employment Center (TREC) boundary and the Keynote Employment District. However, this

land is currently zoned for industrial use. Similarly, Site 20 would be located on land that is zoned for industrial use (the Westwind site). No development plans are proposed for this site. Conversion of Sites 7 and 20 to transportation use would remove them from the local tax base. Site 15 is proposed for airport property in an airport buffer zone and there are no alternate uses available for this land. As a result, no economic impacts are anticipated from the development of this site.

#### 5.1.4.4 BRT/Metrorail Alternative

The economic effects identified for the BRT/Metrorail Alternative are presented in Table 5.1-11.

**Table 5.1-11: Summary of Net Economic Effects for BRT/Metrorail Alternative (2001 dollars)**

| Economic Effects | Unit | Fairfax and Loudoun Counties | Commonwealth of Virginia |
|---|---|---|---|
| Capital Expenditures | $ millions | $882.9 | $694.3 |
| Output | $ millions | $1,044.4 | $1,186.6 |
| Earnings | $ millions | $181.4 | $332.9 |
| Employment | Person-years of jobs | 7,141 | 12,988 |
| Tax Revenue Effects | $ millions/year | $1.314 | n.a.[1] |
| Transit Employment | Jobs (over baseline) | 508 | 508 |

1 Not Applicable.

Under the BRT/Metrorail Alternative, new demand for construction would increase output by $1,044.4 million in Fairfax and Loudoun counties and $1,186.6 million in the commonwealth over the construction period. Of this amount, $181.4 million would be paid to workers as wage and salary earnings for the 7,141 person-year jobs created across all industries in Fairfax and Loudoun counties. Statewide, $332.9 million would be paid to workers as wage and salary earnings for the 12,988 person-years of jobs created across all industries.

In terms of O&M effects, the BRT/Metrorail Alternative would create 9,498 new transit-related jobs in the region, which is 508 more jobs than in the Baseline Alternative. While many of these employees would likely live in Fairfax County, Loudoun County, or the Commonwealth of Virginia, it should be assumed that some of these employees would live in other jurisdictions within the region. The overall net economic effects of the BRT/Metrorail Alternative would be lower than those for the Metrorail and Phased Implementation Alternatives, primarily because the construction costs are significantly lower. This alternative would also bear the negative impacts on the tax base due to property acquisitions in Tysons Corner. The project would not benefit from the increased density allowances for rail at the station areas in the Mid-Corridor section, and the resulting economic development effects and tax revenue benefits to Fairfax and Loudoun counties would be correspondingly lower than those for the Metrorail Alternative.

### 5.1.5 Phased Implementation Alternative

The economic effects identified for the Phased Implementation Alternative are presented in Table 5.1-12.

Under the Phased Implementation Alternative, new demand for construction would increase output by $2,202.9 million in Fairfax and Loudoun counties and $2,305.3 million in the commonwealth over the construction period. Of this amount, $372.6 million would be paid to workers as wage and salary earnings for the 14,623 person-year jobs created across all industries in Fairfax and Loudoun counties. Statewide, $656.7

**Table 5.1-12: Summary of Net Economic Effects for Phased Implementation Alternative (2001 dollars)**

| Economic Effects | Unit | Fairfax and Loudoun Counties | Commonwealth of Virginia |
|---|---|---|---|
| Capital Expenditures | $ millions | $1,908.5 | $1,435.3 |
| Output | $ millions | $2,102.9 | $2,305.3 |
| Earnings | $ millions | $372.6 | $656.7 |
| Employment | Person-years of jobs | 14,623 | 25,582 |
| Tax Revenue Effects | $ millions / year | $1.77 | n.a.[1] |
| Transit Employment | Jobs (over baseline) | 601 | 601 |

1 Not Applicable.

million would be paid to workers as wage and salary earnings for the 25,582 person-years of jobs created across all industries.

In terms of O&M effects, the Phased Implementation Alternative would create 9,591 new transit-related jobs in the region, which is 601 more jobs than in the Baseline Alternative. While many of these employees would likely live in Fairfax County, Loudoun County, or the Commonwealth of Virginia, it should be assumed that some of these employees would live in other jurisdictions within the region. The overall net economic effects of the Phased Implementation Alternative would be greater than all of the other Build Alternatives, mainly because the construction costs are the greatest.

The negative impacts of the Phased Implementation Alternative on the tax base would be greater than the other four Build Alternatives, because the alignment through Tysons Corner would require the acquisition of high-value commercial land. Right-of-way costs for the Phased Implementation Alternative make up approximately five percent of the total capital costs. The impacts are slightly greater than those of the Metrorail alternative because the right-of-way would be procured earlier than with the Metrorail Alternative. However the total amount of acquired property would be the same as that of the Metrorail Alternative. The density allowances at the station areas in the Mid-Corridor section (Wiehle Avenue, Reston Parkway, Herndon-Monroe and the Fairfax County side of Route 28) are higher than those for the BRT and BRT/Metrorail alternatives, and could result in greater economic development effects from development activity and tax revenue benefits in the corridor.

## 5.2 STATION AREA DEVELOPMENT

For analysis of development impacts of the proposed improvements, impact assessment zones were defined around each proposed station. The size of this area varies by location and is based on the area in which direct development impacts are expected. Direct impacts were determined by the comprehensive plans for each jurisdiction, and are defined as the area in which density bonuses are available upon the implementation of the Build Alternatives. For the proposed stations within the Tysons Corner section, the impact assessment zone is defined, generally, as the traffic analysis subzones that fall within 1,600 feet of the stations. In the Mid-Corridor section, zones are defined by land units, as developed by the Dulles Corridor Land Use Task Force, that fall within one-quarter mile of the station platforms. Finally, in the Loudoun County section, impact assessment zones are defined as all land within one-half mile of proposed stations.

### 5.2.1 STATION AREA DEVELOPMENT CHARACTERISTICS

The area around each of the stations, in particular the station area impact assessment zones, have a variety of planning and development characteristics. The station area development characteristics, as well as some of the anticipated long-term effects to the character of the surrounding land uses, are described below by alternative. The changes in development density in the station areas are described more fully in Section 5.3.

#### 5.2.1.1 BRT Alternative

For each station/stop area discussed below, with the exception of the station at the Dulles Airport, more intense development is allowed under the existing comprehensive plans than currently exists. The change in development density and effects of the proposed alternatives are discussed in Section 5.2.3.

#### Alignment BRT 1

The station and stop areas for BRT 1 are described below. Under all of the BRT alignments, additional bus transit facilities would be provided at the West Falls Church Station. These facilities are located within the transportation corridor and would have no long-term effect on the station character in terms of changes in land use, pedestrian environment, or density at the station.

**Spring Hill Road Station Area.** The development around the Spring Hill Road Station is primarily suburban in character. The station platform would be located within the median of the DAAR. One pedestrian bridge would be provided to allow patrons to access the existing Tysons-West*Park Transit Station on the south side of the DAAR. Much of the land within the station area consists of the DAAR and Dulles Toll Road and currently cannot be developed. On the south side of the DAAR the development consists of large office parks and multi-family residential units. The other major development feature is the Tysons-West*Park Transit Station. The area north of the DAAR consists of residential development and the McLean Hamlet Park. Access to the north side of the DAAR is limited by lack of a pedestrian connection.

The Spring Hill Road Station would do little to alter the development character of the area. The only potential for increased density in this area would be through infill development and redevelopment. Under the *Fairfax County Comprehensive Plan*, the density and transit-oriented development (TOD) guidelines only apply to rapid rail stations located in the core of Tysons Corner. The station could result in additional transit access for residents and businesses located to the south of the Dulles Toll Road. Since pedestrian access is not provided to the north, little change in development character is projected, and pedestrian usage from the north is not anticipated.

Under BRT 2 and 3, a stop would be provided at Tysons-West*Park Transit Station, the existing bus transit facility. No changes in character are expected from this stop.

**Wiehle Avenue Station Area.** The Wiehle Avenue Station would be located within the median of the DAAR just west of the Wiehle Avenue overpass. Much of the land within the station area cannot be developed because it consists of the DAAR and Dulles Toll Road. The current development within the station area is suburban in character, consisting of individual office buildings and office parks immediately adjacent to the station platform location. Many of the office buildings were recently constructed and include large surface parking lots and some parking garages. On the north side of the station area, there are limited industrial uses, and two large, surface park-and-ride lots. The Washington & Old Dominion (W&OD) Railroad Regional Park bisects the north side of the transit station area.

The Wiehle Avenue Station would provide pedestrian connections across the Dulles Toll Road to businesses in Reston. In addition, the comprehensive plan allows for mixed-use, transit-oriented development up to a 1.5 floor area ratio (FAR) to occur in the transit station area with the advent of BRT. This new development, in conjunction with the transit station, could create a more transit-supportive environment at the Wiehle Avenue Station. For redevelopment to occur, parcel consolidation, particularly on the north side, would need to occur. In addition, the site of the current park-and-ride lot is proposed as a potential joint development site; and dense, mixed-use development is proposed over the parking facility. The station's new pedestrian facilities provide direct linkages to the pedestrian network in Reston, including the W&OD trail.

**Reston Parkway Station Area**. The development character of the Reston Parkway Station area is similar to that of the Wiehle Avenue Station area. Much of the land within the station area consists of the DAAR and Dulles Toll Road and cannot be developed. Most of the development in the station area consists of large office buildings surrounded by landscaped grounds with both surface and structure parking. The Reston Town Center, located north of the DAAR, is more urban in character, and includes a mix of retail, residential, and office uses in a single development. Several large parking structures surround and provide parking for the Town Center. In addition, a large-scale residential development located on Reston Parkway has recently been completed. On the south, there is some low-rise retail development along Sunrise Valley Drive, a major high-rise office development, and a hotel. There are several undeveloped parcels within the station area, including those just to the west of the Reston Town Center.

The *Fairfax County Comprehensive Plan* allows for mixed-use, transit-oriented development, up to a 1.5 FAR to occur in the transit station area with the advent of BRT. This new development, in conjunction with the transit station, could create a more transit-supportive environment at the Reston Parkway Station. In addition, the Reston Parkway Station would provide pedestrian linkages across the Dulles Toll Road, between the Nextel development and proposed uses on Town Center Parkway. A new station would also provide pedestrian connections directly to several large developments on Sunset Hills Drive, the residential area of West Market, and the Reston Town Center. Additional pedestrian linkages to the station have been proposed, including the potential for air rights development.

**Herndon-Monroe Station Area.** The Herndon-Monroe Station area would include portions of the Town of Herndon and Fairfax County. Much of the land within the station area consists of the DAAR and Dulles Toll Road and cannot be developed. Other development in the station area can be classified as suburban, with residential uses separated from the office development. Because most of the land in this station area is developed, any new development would have to be in the form of re-development. One exception is an undeveloped parcel located south of Herndon Parkway in the eastern portion of the station area.

The Herndon-Monroe Station area does not have much new growth potential with the BRT Alternative. The Town of Herndon is re-evaluating their plans for the area in the hopes of encouraging more transit-supportive development and joint development in the future. Although density bonuses are permitted in this area, a change in development character is limited due to presence of the existing park-and-ride facility, single-family homes, and wetlands associated with the Sunrise Valley Wildlife Park. The Herndon-Monroe Station would provide an additional pedestrian connection between the Town of Herndon and Fairfax County, and would provide access to pedestrian facilities, businesses, and homes located in the station area.

**Route 28 Station Area.** The Route 28 Station would be located to the east of the Dulles Toll Road and Route 28 interchange within Fairfax County. Most of the station area is undeveloped. Development that does exist is located primarily to the north of the Dulles Toll Road, and includes townhouses, a school, the Center

for Innovative Technology (CIT), and some open space. Development plans for the north side include additional residential units. The south side is largely undeveloped, although mixed-use development projects have been approved. Some major suburban office developments and a hotel are located within the area.

The change in character at Route 28 could include new transit-oriented development (particularly south of the Dulles Toll Road), transit facilities such as Kiss & Ride lots, and pedestrian connections throughout the area. Many of these improvements are proposed as elements of the Dulles Station development project, which would be located south of the Route 28 Station. The comprehensive plan allows for density bonuses at this station to encourage compact, high-density development.

**Dulles Airport Stop**. The only developments near the stop at Dulles Airport are airport-related facilities. The development character would not change at the Dulles Airport Stop.

**Route 606 Stop.** The area around the Route 606 Stop in Loudoun County is undeveloped or is part of the Dulles North Transit Center. South of the Dulles Greenway, most of the land is within the confines of the Dulles Airport, limiting the development potential.

An increase in density is permitted in the vicinity of the Route 606 Stop. Residential development is not a permitted use in this location due to the proximity of the Dulles Airport. A TREC would be located at this stop and could support new growth with pedestrian linkages.

**Route 772 Stop.** The area around the Route 772 Stop is also largely undeveloped. Within a half-mile of the stop there are some single-family homes and townhouses. The presence of a transit stop would allow for TOD under the recently adopted *Loudoun County Revised General Plan,* which would include a mix of uses, pedestrian connections, dense development at the station, and limitations on auto-oriented development. Recent development proposals incorporating these principles propose up to 16 million square feet of development, which would change the character of this station from a rural area to a transit-supportive node for the project.

#### Alignment BRT 2

BRT 2 would contain the following stations: West Falls Church, Wiehle Avenue, Reston Parkway, and Herndon-Monroe. Stops would occur at Tysons-West*Park Transit Station, Dulles Airport, Route 606, and Route 772. The development potential of each station/stop area, except the Tysons-West*Park Stop, is the same as that discussed for BRT 1. The Tysons-West*Park Transit Stop would be located at the existing bus transfer facility located on Jones Branch Drive in Tysons Corner. Surrounding land use includes the DAAR and Dulles Toll Road. The area development characteristics around the stop are the same as those described for the Spring Hill Road Station area for BRT 1.

#### Alignment BRT 3

BRT 3 would contain one station (Reston Parkway) and six stops (Tysons-West*Park, Wiehle Avenue, Herndon-Monroe, Dulles Airport, Route 606, and Route 772). The development potential of each station/stop area is the same as that discussed for BRT 1 and BRT 2.

### 5.2.1.2 Metrorail Alternative

Most of the development characteristics for the stations and stops described above for the BRT Alternative also apply to the Metrorail Alternative. A major difference is that the Metrorail Alternative would directly serve Tysons Corner with three to six stations, as described below. The stations and supporting facilities would also

be configured for Metrorail operations rather than BRT operations. The station area development characteristics described above for BRT at Wiehle Avenue, Reston Parkway, Herndon-Monroe, Route 28, Dulles Airport, Route 606 and Route 772 Stations would be the same for the Metrorail Alternative.

As shown in Table 5.2-1, the Metrorail Alternative has four possible alignments in Tysons Corner that would create different station areas, depending on the alignment chosen. The station area for Alignment T9 Design Option would be identical to that for Alignments T9 and T6.

**Table 5.2-1: Station Areas for the Metrorail Alignments**

| Alignment T1 | Alignment T6 | Alignment T9 | Alignment T4 |
|---|---|---|---|
| Tysons East | Tysons East | Tysons East | Tysons East |
| Tysons Central | Tysons Central | Tysons Central | Tysons Central A |
| Tysons West | Tysons Central C | Tysons Central C | Tysons Central B |
| | Tysons West | Tysons West | Tysons Central C |
| | | | Tysons Central D |
| | | | Tysons West |

For consistency, the development character within one-half mile of these stations is assessed, although under the *Fairfax County Comprehensive Plan*, density bonuses for rail stations applies to areas within 1,600 feet of the platform. In some cases, the station areas overlap within Tysons, particularly with Alignment T4 and cannot be developed. Each of the station areas is assessed below.

The primary difference in station area development due to the Metrorail Alternative would occur in Tysons Corner. An additional eight million square feet of development is permitted with the provisions of rapid rail transit through the core of Tysons Corner. As shown in Section 5.3, the provision of rail transit has the potential to change the character of Tysons Corner in the vicinity of all of the transit station areas. Since most of the Tysons Corner core is within the station areas, it is difficult to project specific changes in relation to specific stations. In general, through redevelopment and in-fill development Tysons Corner could become more transit-oriented. Dense development, pedestrian amenities, and mixed uses are anticipated at all of the station locations listed in Table 5.2-1.

### Tysons East (Alignments T1, T6, T9, and T4)

The Tysons East station area would be located on Route 123, Chain Bridge Road east of the Capital Beltway near the intersection of Colshire Drive and would be included in all of the Tysons Corner alignments. Large office buildings with large parking facilities define the character while some low-rise apartment and townhouse communities with on-street parking are also located in the station area. Most of the land is developed, and construction is on-going on the Capital One site, which is directly adjacent to the proposed station.

Because of the availability of low-density and somewhat older structures, there is great potential for this station area to change in character from a suburban pattern to more of a transit-supportive land use mix, if redeveloped. Several of the parcels would be eligible for density bonuses if Metrorail were constructed, resulting in a mixed-use area with direct access to regional transit.

### Tysons Central A (Alignment T4)

The Tysons Central A Station area would be located on Westpark Drive. The development character of this station area is defined by the office development located on either side of the road, and the mid-rise office developments, which are located adjacent to the proposed station platform. Behind the office development is

the Tysons Galleria shopping center and the Hilton hotel. There are also vacant parcels in the station area, including the Lerner development parcels located on Tysons Boulevard. These parcels are also within the Tysons Central D Station area.

Since most of the area's underutilized and vacant land is closest to the proposed station, there are some development opportunities adjacent to the Tysons Central A Station. The provision of a transit station would change the character in the sense that it would provide access to many office and residential buildings in the area, thereby encouraging more pedestrian activity.

### Tysons Central B (Alignment T4)

The Tysons Central B Station area would be located on Westpark Drive at its intersection with International Drive. This station area would have the most residential character of all of the Tysons Corner stations because it would be directly adjacent to the Rotonda condominiums and Avalon Crescent apartments. Both of these communities are mid-rise, gated residential developments. The largest vacant parcel in the station area is south of the Lincoln Apartment complex on Westpark Drive. Several major office buildings are located on Greensboro Drive; however, most of the developments are buffered from surrounding uses either by landscaping, gates, or parking facilities.

The presence of several large residential developments, including the Rotonda, Avalon Crescent, and the Lincoln Apartments limits the redevelopment potential within this station area. However, the provision of a transit station would change the character of the area by providing improved access to many office and residential buildings thereby encouraging more pedestrian activity.

### Tysons Central C (Alignments T6, T9, and T4, with variations on design)

The Tysons Central C Station area would be located along Route 7 just north of the Route 7/123 interchange. The development in this station area includes strip retail with parking lots immediately adjacent to the proposed station platform, and major office development located along Greensboro Drive and Westpark Drive. The scale of the office development is larger than in other areas of Tysons Corner and pedestrian activity is limited. Some townhouses are located within the station area on Gosnell Road, but would be separated from the station platform by the Pike 7 Plaza.

The station proposed at Tysons Central C would be constructed for all of the alignments except Alignment T1. At this location, there is great potential for increased densities as allowed by the *Fairfax County Comprehensive Plan* in the vicinity of rail stations. Much of the land within this area is used as parking for strip-mall developments. While the area is completely developed, there is potential for redevelopment, which would introduce a more transit-oriented development pattern.

### Tysons Central/Central D (Alignments T1, T6, T9, and T4)

The Tysons Central Station (known as Tysons Central D Station for Alignment T4) would be located north of Tysons Corner Center on Route 123 outside the Capital Beltway. The primary features of this area are the undeveloped parcels located north of the proposed station location. Development proposals for these parcels include office and possible mixed-use development, oriented toward the station. Farther to the north within this area is the Tysons Galleria, while a landscaped area and parking for Tysons Corner Center is located south of the station. The area is auto-oriented, as all buildings are set back from major arterial roadways and the Capital Beltway. Most of the development is separate from surrounding uses and there is little pedestrian activity due to the large surface parking lots and scale of the roadways in the area. However, the large tracts of surface parking within the station area could be redeveloped at greater density.

The currently undeveloped land north of the station is projected to be developed as part of the Baseline Alternative. The presence of a station in this location would provide pedestrian linkages to Tysons Corner Center and Tysons Galleria and would allow more intense development under the density bonuses allowed in the comprehensive plan. The ability of this transit station area to change in character is limited somewhat by the large amount of acreage dedicated to major roadways and the existing shopping malls.

**Tysons West (Alignments T1, T6, T9, and T4)**

The Tysons West Station area would be located on Route 7 at the intersections with Tyco Road and Spring Hill Road. A variety of uses exist in the station area, including strip-development retail, industrial, commercial, as well as some residential development that would be separate from the station location. Two features dominate the development character of this area: Route 7, a major arterial that is heavily traveled with few pedestrian crossings; and several large auto dealerships. The combination of these two features results in a large amount of space in the station area that is currently used for surface parking lots and roadways. In addition, the industrial component located along Tyco Road limits pedestrian activity. This area is planned for redevelopment as the market supports it, as defined in the *Fairfax County Comprehensive Plan*.

The potential for a change in character at Tysons West exists for all of the Tysons Corner Metrorail alignments. The area is auto-oriented and could become more transit-oriented in the future as more density is allowed should the transit station be constructed. However, there would be some constraints to this redevelopment, due to the lack of pedestrian connections over Route 7 and the presence of successful auto dealerships that might not be likely to redevelop. Nonetheless, the construction of the station would encourage a more transit-supportive character in the area.

#### 5.2.1.3 BRT/Metrorail Alternative

The station areas for the BRT/Metrorail Alternative are discussed in the preceding sections. Under this alternative, the change in development character at the proposed stations would be the same as those discussed above for the BRT Alternative for areas west of Tysons Corner, and the Metrorail Alternative for areas between the Orange Line Connection and Tysons Corner.

#### 5.2.1.4 Phased Implementation Alternative

The station areas for the Phased Implementation Alternative are discussed above for the BRT and Metrorail Alternatives. Under this alternative, the change in development character at the proposed stations would initially be identical to the BRT Alternative. Then, over time as Metrorail is implemented first from the Orange Line through Tysons Corner, and then between Tysons Corner and Loudoun County, the development character at the station areas would shift to be that of the Metrorail Alternative.

### 5.2.2 STATION AREA PLANNING AND DESIGN GUIDELINES

*The Fairfax County Comprehensive Plan* and the *Loudoun County Revised General Plan* include design guidelines for areas surrounding the proposed stations. The following sections discuss the guidelines, as they would apply to each section of the study area.

#### 5.2.2.1 Orange Line Connection

No stations are planned within this portion of the corridor.

#### 5.2.2.2 Tysons Corner

Tysons Corner has been designated as an urban center in the *Fairfax County Comprehensive Plan*. Although the land area is split between the McLean and Vienna Planning Districts, the Comprehensive Plan dedicates a separate section to the Tysons Corner Urban Center, and describes detailed plans for development. These plans include use, density FAR, height, and urban design guidelines.

The Comprehensive Plan divides the Tysons Corner Urban Center into three generalized areas: core, non-core, and edges. The core, generally bounded by Westpark Drive on the north, the Capital Beltway on the east, and Route 7 on the south and west, is divided into three activity centers. These activity centers are designated Tysons I, Tysons II, and Greensboro Drive and encompass about 20 percent of the land area in Tysons Corner. Surrounding the core, the non-core areas are divided into six sub-areas: West*Park; West Gate; East Route 7; West Route 7; a high-density residential area; and Tyco Road. Beyond the non-core areas, the plan designates an "edge" that defines the limits of Tysons Corner and serves as a buffer to adjacent single-family neighborhoods. The outer limits of this edge are roughly the DAAR and Dulles Toll Road to the north, Magarity Road to the east, Old Courthouse Road to the south, and the Courthouse Spring Branch Environmental Quality Corridor to the west.

In the core areas, a greater emphasis is placed on the development of mixed-use centers. However, given the development in place, the Greensboro Drive activity center is envisioned to remain a predominantly office employment center, and the Tysons I activity center would be primarily characterized as a retail center. The Tysons II area has the greatest potential for a balanced mix of uses due to the large amount of undeveloped land.

The non-core areas, despite some infill redevelopment and design improvements, are planned to have a predominantly suburban character. Today, these areas include a range of uses generally clustered by the following uses: office parks, strip retail, and auto dealerships. These areas are envisioned to maintain their general uses with some conversion of strip retail into office development with integrated retail. Beyond these areas, the edges are designed to buffer the single-family neighborhoods surrounding Tysons Corner, which are expected to remain primarily residential in nature and not absorb much additional development.

The urban design guidelines established in the Comprehensive Plan cover a range of features including building heights, gateways, pedestrian and transit oriented design, and streetscaping. The Comprehensive Plan calls for varied heights and roof forms based on proximity to a rail station to create identifying features for specific areas. Gateways are either natural or man-made landmarks that announce to motorists or pedestrians that they have entered a "place." Gateways can take the form of a cohesive signing system, distinctive landscaping, or even buildings.

One of the primary objectives of the plan for Tysons Corner is to provide alternative modes of transportation, including an emphasis on pedestrian- and transit-oriented design. The plan calls for mixed-use developments, connected to transit and accessible by foot on a network of sidewalks, trails, plazas, and courtyards. The plan further calls for these physical connections to be attractive and appealing to pedestrians, with the inclusion of trees, signage, and street furniture.

#### 5.2.2.3 Mid-Corridor

The area included in the Mid-Corridor section of the study area falls within four Planning Districts in the *Fairfax County Comprehensive Plan*. East of Difficult Run, north of the DAAR is part of the McLean Planning District, and the area south of the DAAR is in the Vienna Planning District. West of Difficult Run, the

remainder of the study area is within the Upper Potomac Planning District, which is further designated into the Dulles and Reston-Herndon suburban centers.

The Reston-Herndon Suburban Center is located along the north and south sides of the DAAR and is bounded generally by Centreville Road on the west, areas along Sunrise Valley Drive on the south, Hunter Mill Road on the east, and areas adjoining Sunset Hills Road on the north. The area includes three of the proposed stations and is subdivided into separate "land units" for the purpose of organizing plan recommendations.

The primary planning objective for the stations areas within the Reston-Herndon Suburban Center is to create mixed-use developments with a more urban character in areas closest to the stations. The recently adopted amendments to the Comprehensive Plan include a set of design guidelines with two primary goals: first, to create a pedestrian-friendly environment that would complement the plan recommendations; and second, to protect the existing high-quality built environment and natural environment which currently exists in the center.

The design guidelines are divided into two categories: those that apply to the entire transit station area and those that apply only to the area within one-quarter mile of the station. The guidelines applicable to the entire station area address the development character and form, with particular emphasis on appropriate transitions from the station area into the existing residential areas at the periphery. The guidelines for the core of the station areas focus on creating developments that are pedestrian-friendly and supportive of the transit facility.

The design guidelines cover a range of issues from building design, height, and arrangement to transit access and pedestrian and bicycle connections. These guidelines place the densest development immediately adjacent to the transit stations and the DAAR with densities tapering off toward the existing neighborhoods. They also require physical connections for pedestrians and bicycles to the stations and within the station areas. Other requirements include underground parking or parking structures when possible, the prohibition of freestanding retail establishments, provision of plazas or courtyards, and coordinated lighting and signage. Finally, the plan addresses more intangible design features, such as interesting and varied facades and rooflines and creating a sense of enclosure and defined space, which can encourage pedestrian activity and use of the transit station.

#### 5.2.2.4 Dulles Airport

The design of the station at the Dulles Airport would be coordinated with MWAA and would be accommodated in plans for the airport. The design of areas outside of the station, including pedestrian access, parking, and circulation is managed by MWAA.

#### 5.2.2.5 Loudoun County

The *Loudoun County Revised General Plan* includes guidelines for development around the Route 606 and Route 772 Stations. The plan identifies the Route 606 Station area as a TREC and the Route 772 Station area as TOD. Although the TOD would include a significant amount of residential development and the TREC would not, the general design guidelines apply to both areas.

The plan calls for the areas around the two stations to be developed in a transit and pedestrian friendly manner, with short blocks and a rectilinear grid street pattern. Guidelines include pedestrian-oriented building facades with ground-floor retail and distinctive public spaces.

At Route 772, the plan calls for a commercial core defined by a one-quarter mile radius around the station and an outer core between the one-quarter and one-half mile radii. If the station is to be located within the median of the Greenway, the plan encourages the creation of an urban deck over the roadway.

### 5.2.3 MITIGATION

No mitigation measures are proposed. Station area developments would enhance the transit-supportive character of the area surrounding the proposed stations. The change from a predominantly suburban character into a transit corridor with supporting land uses could increase regional mobility, enhance pedestrian connections, and provide for a mix of uses at the transit station areas in the corridor.

## 5.3 DEVELOPMENT EFFECTS

This section assesses the level of development projected in the corridor as a result of the Build Alternatives and compares it with the Baseline Alternative. The data presented is based on a real estate assessment of the parcels within the corridor that would be located within walking distance of the station areas (defined as one-half mile). Obstacles that would hinder development, such as the presence of recently constructed buildings, residential properties, or small parcel sizes were considered as part of the analysis. These projections are based on the continuation of the positive market conditions within the corridor and predict that much of the development potential allowed in local comprehensive plans would be achieved. For many of the parcels evaluated it is also projected that full density bonuses due to proximity to transit stations and the inclusion of housing will be allowed. In this sense, this analysis presents a form of worst-case scenario in that the level of development projected is close to build-out in some sections of the corridor. The local jurisdictions will ultimately determine the level of growth actually allowed in the future.

### 5.3.1 CORRIDOR DEVELOPMENT PROJECTIONS

The Dulles Corridor is one of the region's fastest growing areas and is expected to continue growing over the next 25 years. The intensity of development in the station areas could increase with the implementation of the Build Alternatives. The Build Alternatives are not, however, expected to have a significant impact on development outside the station areas where market forces would continue to be primary factors that control the timing and quantity of development. The influence of the project on development outside of station areas is discussed in Chapter 9.

The development projections were determined based on a real estate evaluation of the study area, and were developed in conjunction with Fairfax and Loudoun counties. The method for developing the projections included a parcel-by-parcel evaluation of development in the corridor. A variety of criteria were used to determine the level of development. These criteria included the size of the parcel under consideration, ownership, visibility, access to the site for vehicular and transit patronage, environmental constraints, location, and overall development characteristics of the area. Parcels containing recently constructed buildings or containing residential development were not considered as primary locations for development.

Parcels located within the transit station areas, as defined in the comprehensive plans for the localities, are eligible for density bonuses. Information on existing development within the transit station areas was gathered from the localities, and field verified. This data was used to verify the regional projections from the Metropolitan Washington Council of Governments (MWCOG) Round 6.2 Forecasts. Round 6.2 includes projections for growth within the corridor for four categories—retail (including hotel and institutional

development), industrial, office, and residential development. Baseline projections were developed using the MWCOG data and adjusting the totals for growth that has already occurred.

For each alternative, the potential level of growth within the corridor was determined by calculating the potential development associated within the proposed transit station areas. These development totals were estimated by reviewing a variety of factors that could affect development within the station areas, including the availability of vacant land for development, the need for parcel consolidation, development constraints, and the market attractiveness of the station area. This level of growth projected may or may not occur, depending on the decisions of the localities that control development and land use decisions within the corridor. In addition, the analysis assumes that most of the development potential within the corridor will be achieved and allowed by the local jurisdictions.

Table 5.3-1 shows the development potential for the corridor for each alternative. Development potential totals for each station area are presented in Section 5.3.2.

**Table 5.3-1: Corridor Development Potential Projections (in square feet)**

| Projection (2025) | Office | Retail | Industrial | Residential | Total | Increment from 2025 Baseline |
|---|---|---|---|---|---|---|
| Existing | 45,886,800 | 16,617,150 | 13,237,700 | 101,205,000 | 176,946,650 | n.a.[1] |
| Baseline | 77,742,300 | 29,929,050 | 27,218,800 | 169,748,500 | 304,638,650 | n.a. |
| BRT 1 | 83,795,429 | 34,294,572 | 28,097,590 | 181,523,441 | 327,711,032 | 23,072,382 |
| BRT 2 | 79,262,023 | 32,257,544 | 28,134,284 | 177,668,365 | 317,322,216 | 12,683,566 |
| BRT 3 | 78,266,613 | 30,840,322 | 28,370,252 | 173,424,506 | 310,901,693 | 6,263,043 |
| Metrorail (T1) | 93,917,908 | 35,295,233 | 27,770,644 | 185,234,504 | 342,218,289 | 37,579,639 |
| Metrorail (T6) | 94,304,380 | 35,798,612 | 27,770,644 | 187,283,043 | 345,156,679 | 40,518,029 |
| Metrorail (T9) | 94,304,380 | 35,798,612 | 27,770,644 | 187,283,043 | 345,156,679 | 40,518,029 |
| Metrorail (T4) | 95,079,046 | 35,993,910 | 27,770,644 | 188,489,939 | 347,333,539 | 42,694,889 |
| Phased Implementation | 93,917,908 to 95,079,046 | 35,295,233 to 35,993,910 | 27,770,644 | 185,234,504 to 188,489,939 | 342,218,289 to 347,333,539 | 37,579,639 to 42,694,889 |

1 Not Applicable.
Data for the Hotel and Institutional uses is included in the Retail category. Build Alternative estimates are based on Baseline estimate plus increased development projected at station areas.
Source: MWCOG Round 6.2 Forecasts (Existing and Baseline only).

The most significant increases in potential development are expected in the residential and commercial (office) categories. These development projections reflect the density bonuses available in the *Fairfax County Comprehensive Plan* and the *Revised Loudoun County General Plan* based on the implementation of the Build Alternatives. Those alternatives that have the most transit stations would accommodate the most growth. Among the BRT alignments, BRT 1 has the potential for the most development since it has the greatest number of stations in Fairfax County. The table also illustrates that much more transit-oriented growth is projected with the construction of the Metrorail Alternative. Since rail stations would trigger density bonuses in Tysons Corner, more transit-oriented development would be allowed with the selection of the Metrorail and BRT/Metrorail alternatives. Of the Metrorail alignments, Alignment T4 has the most development potential since it would provide the greatest number of stations in Tysons Corner (six). Alignments T6, T9, and T9 Design Option would follow with four stations in Tysons Corner, and Alignment T1 would have less potential with three stations in Tysons Corner. The BRT Alternative and the Baseline Alternative would have the least potential with no Metrorail stations in Tysons Corner.

### 5.3.2 STATION AREA DEVELOPMENT POTENTIAL

The development projections discussed below for the Build Alternatives are based on the project team's independent assessment of existing development and estimates of future market conditions.

#### 5.3.2.1 BRT Alternative

The BRT Alternative, depending on the alignment, would include construction of stations within the DAAR median, and stops at existing park-and-ride lots and Dulles Airport. The stop at Dulles Airport would be incorporated into the airport terminal and the stops at Routes 606 and 772 would be outside the Dulles Greenway. Comprehensive plans for Fairfax and Loudoun counties provide for density bonuses in certain areas depending on the implementation of BRT in the corridor. In Fairfax County, recently adopted plan amendments provide options that allow for additional density in the Wiehle Avenue, Reston Parkway, Herndon-Monroe, and Route 28 station areas. In Loudoun County, the *Toll Road Plan* allows density bonuses in the designated node areas. The following sections discuss the projected changes in the level of development in each of the station areas due to the implementation of the BRT Alternative.

**Orange Line Connection**

There are no stations proposed in this section of the corridor.

**Tysons Corner**

The *Fairfax County Comprehensive Plan* calls for no land use or development intensity changes in the Tysons Corner area based on the implementation of the BRT Alternative.

**Mid-Corridor**

In this section of the corridor, the BRT Alternative differs among the alignment options. BRT 1 and BRT 2 include the Wiehle Avenue, Reston Parkway, and Herndon-Monroe station areas. BRT 1 includes one additional station at Route 28. BRT 3 includes only one station at Reston Parkway.

The two station areas that have the highest levels of growth potential are the Wiehle Avenue and Route 28 Stations. The level of development potential at the Route 28 Station is significantly greater than that of the other stations areas, with roughly an additional 10 million square feet permitted or projected, compared to an average of 4 to 5 million more square feet of development at the other station areas. In all other station areas, there is mixed-use development projected, and the redevelopment of industrial property is projected as the market responds to the transit stations. The land use mix shown in the tables below is consistent with the recent changes adopted in the *Fairfax County Comprehensive Plan*.

The primary change in BRT 2 is the elimination of the station at Route 28, which reduces the total level of development within the corridor, since no land would be eligible for the density bonuses defined in the comprehensive plan. All other projections are the same as for BRT 1.

BRT 3 has the lowest level of development projected, since stations at Wiehle and Herndon-Monroe are converted to stops, and the Route 28 Station is eliminated. Under the comprehensive plan, median stations must be constructed in order for the density bonuses to be allowed.

**Wiehle Avenue Station Area (BRT 1 and BRT 2).** The recently approved modifications to the *Fairfax County Comprehensive Plan* in this area provide for changes in land use. Most of the land units within one-half mile of the station are to be developed for mixed-use with a significant amount of residential units.

The plan calls for 35 to 50 percent of development to be residential, up to 50 percent office, and up to 15 percent retail, with the option for hotel uses. The parcels in the northwest quadrant of the Wiehle Avenue/Dulles Toll Road interchange, including the park-and-ride lot, also have the option to develop as mixed-use without residential with a maximum of 70 percent office use and a slightly lower density than the residential option. Table 5.3-2 details the projected level of development for the station area based on the guidelines provided in the Comprehensive Plan and projected market conditions.

**Table 5.3-2: Wiehle Avenue Station Area Development – BRT Alternative (in square feet)**

| Projection | Office | Retail | Hotel | Industrial | Institutional | Residential | Total |
|---|---|---|---|---|---|---|---|
| Existing | 3,713,183 | 39,603 | 0 | 354,275 | 13,831 | 521,437 | 4,642,329 |
| Baseline (2025) | 4,880,183 | 111,034 | See Note | 266,775 | See Note | 521,437 | 5,779,429 |
| BRT (2025) | 5,389,249 | 434,059 | 600,896 | 0 | 0 | 3,862,099 | 10,286,303 |

2025 Baseline data for the Hotel and Institutional categories is included in the Retail category.
Source: MWCOG Round 6.2 Forecasts (Baseline Only)

**Reston Parkway Station Area (BRT 1, BRT 2, and BRT 3).** The recent modifications to the *Fairfax County Comprehensive Plan* allow for changes to land use based on the implementation of the BRT Alternative. Similar to the Wiehle Avenue Station, properties near the proposed station are eligible for density bonuses under a series of plan options and are dependent on achieving a certain mix of uses. At this station, most of the land units within one-half mile of the station can be developed as mixed-use with a significant amount of residential use. The plan calls for 35 to 50 percent of development to be residential, up to 50 percent office, and up to 15 percent retail, with the option for hotel uses. The parcels immediately to the north and south of the transit station have the option to develop as mixed-use without residential with a maximum of 70 percent office use and a slightly lower density than the residential option.

Table 5.3-3 shows the projected levels of potential development for the station area based on the guidelines provided in the comprehensive plan and projected market conditions.

**Table 5.3-3: Reston Parkway Station Area Development – BRT Alternative (in square feet)**

| Projection | Office | Retail | Hotel | Industrial | Institutional | Residential | Total |
|---|---|---|---|---|---|---|---|
| Existing | 4,968,936 | 360,745 | 714,495 | 0 | 0 | 995,686 | 7,039,862 |
| Baseline (2025) | 6,342,936 | 1,328,590 | See Note | 0 | See Note | 1,358,186 | 9,029,712 |
| BRT (2025) | 6,618,614 | 881,461 | 1,398,217 | 0 | 0 | 4,502,157 | 13,400,449 |

2025 Baseline data for the Hotel and Institutional categories is included in the Retail category.
Source: MWCOG Round 6.2 Forecasts (Baseline Only)

**Herndon-Monroe Station Area (BRT 1 and BRT 2).** With the implementation of BRT at the proposed Herndon-Monroe Station, the *Fairfax County Comprehensive Plan* options are the same as those associated with the Wiehle Avenue and Reston Parkway station areas. The parcel immediately to the east of the Herndon-Monroe park-and-ride facility may develop as mixed-use without residential, with a maximum of 70 percent office use and a slightly lower density than the residential option. Land north of the proposed station that lies within the Town of Herndon is not anticipated to change in use with implementation of BRT Alternative, or the parcels that include the Herndon-Monroe park-and-ride facility and the Sunrise Valley Park Wildlife Habitat and Nature Preserve. Table 5.3-4 shows the projected levels of development for the station area based on the guidelines provided in the comprehensive plan and projected market conditions.

**Table 5.3-4: Herndon-Monroe Station Area Development – BRT Alternative (in square feet)**

| Projection | Office | Retail | Hotel | Industrial | Institutional | Residential | Total |
|---|---:|---:|---:|---:|---:|---:|---:|
| Existing | 1,396,245 | 242,876 | 0 | 374,846 | 0 | 1,376,347 | 3,390,313 |
| Baseline (2025) | 1,683,345 | 242,876 | See Note | 374,846 | See Note | 1,376,347 | 3,677,413 |
| BRT (2025) | 2,169,688 | 463,176 | 273,000 | 405,653 | 0 | 2,279,544 | 5,591,061 |

Note: 2025 Baseline data for the Hotel and Institutional categories is included in the Retail category.
Source: MWCOG Round 6.2 Forecasts (Baseline Only)

**Route 28 Station Area (BRT 1).** With the implementation of BRT at the Route 28 Station, the *Fairfax County Comprehensive Plan* options are the same as those associated with the Reston-Herndon station areas. South of the proposed station, the plan recommends, but does not specify, a mix of uses including office and high-density residential. Table 5.3-5 shows the projected levels of development for the station area based on the guidelines provided in the comprehensive plan and projected market conditions.

**Table 5.3-5: Route 28 Station Area Development – BRT Alternative (in square feet)**

| Projection | Office | Retail | Hotel | Industrial | Institutional | Residential | Total |
|---|---:|---:|---:|---:|---:|---:|---:|
| Existing | 1,583,605 | 0 | 203,752 | 0 | 1,000 | 1,463,018 | 3,251,375 |
| Baseline (2025) | 2,460,827 | 264,637 | See Note | 36,694 | See Note | 1,933,966 | 4,696,119 |
| BRT (2025) | 6,994,233 | 1,276,705 | 810,032 | 0 | 214,923 | 5,789,043 | 15,084,936 |

2025 Baseline data for the Hotel and Institutional categories is included in the Retail category.
Source: MWCOG Round 6.2 Forecasts (Baseline Only)

### Dulles Airport

MWAA's Master Plan guides development at the Dulles Airport. Implementation of these plans is not tied to the provision of BRT service to the airport. Therefore, the project would not have any effect on the timing or quantity of development at the airport.

### Loudoun County

The Loudoun County project section includes two stop areas, located near the Route 606 and Route 772 interchanges with the Dulles Greenway.

**Route 606 Stop.** The *Loudoun County Revised General Plan* establishes a TREC near the Route 606 Stop. This designation provides for the creation of a mixed-use transit node with office, light industrial, and supporting uses. With the implementation of BRT, the maximum allowable density increases from 0.6 FAR to 1.0 FAR. Airport noise restrictions prohibit the construction of residential units in this area. Table 5.3-6 shows the projected levels of development for the area around the stop based on the guidelines provided in the Revised General Plan and projected market conditions.

**Table 5.3-6: Route 606 Stop Area Development – BRT Alternative (in square feet)**

| Projection | Office | Retail | Hotel | Industrial | Institutional | Residential | Total |
|---|---:|---:|---:|---:|---:|---:|---:|
| Existing | 0 | 0 | 0 | 472,380 | 0 | 0 | 472,380 |
| Baseline (2025) | 403,174 | 39,816 | See Note | 248,130 | See Note | 0 | 691,121 |
| BRT (2025) | 0 | 0 | 0 | 1,399,583 | 0 | 0 | 1,399,583 |

2025 Baseline data for the Hotel and Institutional categories is included in the Retail category
Source: MWCOG Round 6.2 Forecasts (Baseline Only)

**Route 772 Stop.** The *Loudoun County Revised General Plan* includes plans for the development of a TOD node at the Route 772 Stop. The planned TOD is a high-density node offering a full mix of uses, including

residential, commercial, retail, and civic. With the implementation of BRT, the plan allows for an increase from 0.6 FAR and 16 dwelling units per acre to 1.0 FAR and 32 dwelling units per acre, with the highest densities closest to the station. Table 5.3-7 shows the projected levels of development for the area around the stop based on the guidelines provided in the Revised General Plan and projected market conditions.

**Table 5.3-7: Route 772 Stop Area Development – BRT Alternative (in square feet)**

| Projection | Office | Retail | Hotel | Industrial | Institutional | Residential | Total |
|---|---|---|---|---|---|---|---|
| Existing | 0 | 0 | 0 | 0 | 0 | 336,255 | 336,255 |
| Baseline (2025) | 2,607,238 | 362,116 | See Note | 0 | See Note | 1,064,070 | 4,033,424 |
| BRT (2025) | 3,259,047 | 362,116 | 0 | 0 | 0 | 1,596,105 | 5,217,268 |

2025 Baseline data for the Hotel and Institutional categories is included in the Retail category.
Source: MWCOG Round 6.2 Forecasts (Baseline Only)

#### 5.3.2.2 Metrorail Alternative

The *Fairfax County Comprehensive Plan* and the *Loudoun County Revised General Plan* provide for density bonuses at the new Metrorail station locations. The following sections describe the projected changes in the level of development in each of the station areas due to the implementation of the Metrorail Alternative.

**Orange Line Connection**

No stations are proposed for this section of the corridor.

**Tysons Corner**

The *Fairfax County Comprehensive Plan* identifies the desirability of rail service in Tysons Corner. To increase ridership, the plan allows for greater development densities on parcels proximate to the proposed stations. Although the plan only identifies stations at three locations (Tysons East, Tysons Central, and Tysons West), it is assumed that density increases would be applied, where appropriate, regardless of station location. This assumption is reflected in the analysis below. In addition to the development projections discussed below for the individual stations, the development projections for each alignment through Tysons Corner are also presented for comparison purposes.

These density bonuses would be allowed for areas within 1,600 feet and/or 1,000 feet of the transit station area. Additional density bonuses would occur if housing were part of the development mix for the parcel. The development totals presented in this analysis include both bonuses. In analyzing the stations in terms of potential development effects, all of the station areas are projected to increase in office, retail, and residential development over the Baseline Alternative. The stations with the most development projected include the Tysons Central C Station and Tysons West Station. The level of development change is not as significant as that projected in the Mid-Corridor or Loudoun County, since Tysons Corner is already substantially developed. At some stations, such as Tysons East, Tysons Central C, and Tysons West, redevelopment of either older residential areas or industrial uses is projected as the market responds to transit. Little new development potential is projected at the Tysons Central A and Tysons Central B stations, as they are proposed in areas that are fully developed.

The alignment with the most development potential is Alignment T4, which would result in 10 million square feet of development compared to the Baseline Alternative. This level of development assumes that Fairfax County would allow most of the total potential to occur, although full build-out is not projected. In this sense, the development projection is a worst-case scenario as the County may limit the total level of development to a lower level, especially if other elements of the plan are not achieved such as the mode-split goals that are

incorporated into the plan. Total development would be limited if more than 80 percent of travel is performed by single-occupant vehicles. Since the stations provide access in only one direction, this overall mode split goal may not be achievable. Another factor that might limit the development potential of Alignment T4 is the one-way configuration of the stations. The stations would not provide access to both inbound and outbound traffic, which may limit the overall market potential. For the purpose of this analysis, it was assumed that the land would still be extremely attractive to developers who would seek the maximum level of development allowed in the Comprehensive Plan, since the Comprehensive Plan does not provide different density bonuses based on the functionality of transit stations. In addition, the Comprehensive Plan includes level of service requirements that if not met would limit the amount of allowable development.

Most of the growth projected is in the office and residential component, resulting in a mixed-use land pattern at each station area. Alignments T6, T9, and the T9 Design Option could result in an additional eight million square feet of development within Tysons Corner. The alignment with the least effect on the amount of potential development would be the Alignment T1; an additional 5 million square feet of development would be projected with this alignment. It has the lowest total because it has fewer transit station areas. Total build-out within Tysons Corner is not projected as some parcels have limited overall development potential, although for most parcels 90 to 100 percent of build-out is predicted. The level of development projected does not exceed the caps in the Comprehensive Plan.

**Tysons East.** The Comprehensive Plan provides for increased densities in the areas surrounding the proposed Tysons East Station. To the north of Route 123, the plan recommends intensities of 0.5 to 1.0 FAR without rail service. With rail service the plan allows non-residential development up to 1.5 FAR within 1,000 feet of the station, and up to 1.0 FAR between 1,000 and 1,600 feet. If housing is provided these rail-related intensities could increase by 50 percent South of Route 123, the plan allows all of the areas along Old Meadow Road and Colshire Drive to increase to a maximum of 1.0 FAR, however, the intensity increases allowed north of Route 123 also apply in this area.

Table 5.3-8 shows the projected levels of development for the station area based on the guidelines provided in the Comprehensive Plan and projected market conditions.

**Table 5.3-8: Tysons East Station Area Development (in square feet)**

| Projection | Office | Retail | Hotel | Industrial | Institutional | Residential | Total |
|---|---:|---:|---:|---:|---:|---:|---:|
| Existing | 1,102,775 | 0 | 0 | 127,346 | 0 | 998,220 | 2,228,341 |
| Baseline (2025) | 3,573,300 | 37,350 | See Note | 101,500 | See Note | 856,000 | 4,568,150 |
| Metrorail (2025) | 4,466,890 | 108,839 | 0 | 0 | 0 | 2,241,529 | 6,817,258 |

2025 Baseline data for the Hotel and Institutional categories is included in the Retail category.
Source: MWCOG Round 6.2 Forecasts (Baseline Only)

**Tysons Central A.** Although the Comprehensive Plan does not explicitly provide for density increases based on a rail station at this location, it was assumed by the project team that allowable density would be increased in accordance with the general guidelines of the plan. For core areas (in this case the area south of Westpark Drive) the plan allows densities up to 2.0 FAR within 1,000 feet of the station and 1.65 FAR between 1,000 and 1,600 feet of the station. For non-core areas the allowable densities are lower: 1.5 FAR within 1,000 feet and 1.0 between 1,000 and 1,600 feet. If housing is provided, these rail-related intensities could be increased by 50 percent. Table 5.3-9 shows the projected levels of development for the station area based on the guidelines provided in the Comprehensive Plan and projected market conditions.

**Table 5.3-9: Tysons Central A Station Area Development (in square feet)**

| Projection | Office | Retail | Hotel | Industrial | Institutional | Residential | Total |
|---|---|---|---|---|---|---|---|
| Existing | 2,644,089 | 0 | 420,053 | 0 | 0 | 0 | 3,064,142 |
| Baseline (2025) | 4,403,700 | 250,650 | See Note | 0 | See Note | 0 | 4,654,350 |
| Metrorail (2025) | 4,573,627 | 96,711 | 299,073 | 0 | 0 | 0 | 4,969,411 |

2025 Baseline data for the Hotel and Institutional categories is included in the Retail category
Source: MWCOG Round 6.2 Forecasts (Baseline Only)

**Tysons Central B.** As was the case for Tysons Central A, the Comprehensive Plan does not explicitly provide for density increases based on a rail station at this location. Therefore it is assumed that the allowable density could be increased in accordance with the general guidelines of the plan for areas south of Westpark Drive, and for core and non-core areas. Table 5.3-10 shows the projected levels of development for the station area based on the guidelines provided in the Comprehensive Plan and projected market conditions.

**Table 5.3-10: Tysons Central B Station Area Development (in square feet)**

| Projection | Office | Retail | Hotel | Industrial | Institutional | Residential | Total |
|---|---|---|---|---|---|---|---|
| Existing | 1,657,197 | 65,609 | 0 | 0 | 0 | 1,958,941 | 3,681,747 |
| Baseline (2025) | 2,232,300 | 26,550 | See Note | 0 | See Note | 3,017,000 | 5,275,850 |
| Metrorail (2025) | 2,837,039 | 76,462 | 0 | 0 | 252 | 4,223,896 | 7,137,649 |

2025 Baseline data for the Hotel and Institutional categories is included in the Retail category.
Source: MWCOG Round 6.2 Forecasts (Baseline Only)

**Tysons Central C.** The Comprehensive Plan provides for increased densities in the areas surrounding the Tysons Central C Station. For core areas (in this case the area east of Route 7) the plan allows densities up to 2.0 FAR within 1,000 feet of the station and 1.65 FAR between 1,000 and 1,600 feet of the station. For non-core areas the allowable densities are lower: 1.5 FAR within 1,000 feet and 1.0 between 1,000 and 1,600 feet. If housing is provided, these rail-related intensities could increase by 50 percent. Table 5.3-11 shows the projected levels of development for the station area based on the guidelines provided in the Comprehensive Plan and projected market conditions.

**Table 5.3-11: Tysons Central C Station Area Development (in square feet)**

| Projection | Office | Retail | Hotel | Industrial | Institutional | Residential | Total |
|---|---|---|---|---|---|---|---|
| Existing | 1,997,349 | 571,085 | 158,521 | 0 | 2,100 | 301,835 | 3,030,890 |
| Baseline (2025) | 3,687,600 | 698,400 | See Note | 0 | See Note | 254,500 | 4,640,500 |
| Metrorail (2025) | 4,074,071 | 714,178 | 485,258 | 0 | 2,344 | 2,303,039 | 7,578,890 |

2025 Baseline data for the Hotel and Institutional categories is included in the Retail category.
Source: MWCOG Round 6.2 Forecasts (Baseline Only)

**Tysons Central/Tysons Central D.** The Comprehensive Plan provides for increased densities in the areas surrounding the proposed Tysons Central/Central D Station. To the north of Route 123, the plan allows the currently planned 1.0 FAR maximum to increase to 2.0 FAR within 1,000 feet of the station and to 1.65 FAR between 1,000 and 1,600 feet of the station. South of Route 123, the plan allows the existing 0.8 FAR to increase to 2.0 FAR within 1,000 feet of the station and to 1.65 FAR between 1,000 and 1,600 feet of the station. If housing is provided, these rail-related intensities could increase by 50 percent. Table 5.3-12 shows the projected levels of development for the station area based on the guidelines provided in the Comprehensive Plan and projected market conditions.

**Table 5.3-12: Tysons Central D Station Area Development (in square feet)**

| Projection | Office | Retail | Hotel | Industrial | Institutional | Residential | Total |
|---|---|---|---|---|---|---|---|
| Existing | 556,372 | 3,322,061 | 716,812 | 0 | 0 | 0 | 4,595,245 |
| Baseline (2025) | 3,767,100 | 3,991,050 | See Note | 0 | See Note | 333,500 | 8,091,650 |
| Metrorail (2025) | 4,018,473 | 3,731,447 | 666,958 | 0 | 0 | 0 | 8,416,878 |

Note: 2025 Baseline data for the Hotel and Institutional categories is included in the Retail category.
Source: MWCOG Round 6.2 Forecasts (Baseline Only)

**Tysons West.** The Comprehensive Plan does not provide for increased densities in all areas surrounding the proposed Tysons West Station. South of Westwood Center Drive/Tyco Road, on both sides of Route 123 the plan allows the planned densities to increase to 1.5 FAR within 1,000 feet of the station and to 1.0 FAR between 1,000 and 1,600 feet of the station. If housing is provided, these rail-related intensities could increase by 50 percent. North of this area, the plan does not include density bonuses associated with the station and limits development to a maximum of 1.0 FAR. Table 5.3-13 shows the projected levels of development for the station area based on the guidelines provided in the Comprehensive Plan and projected market conditions.

**Table 5.3-13: Tysons West Station Area Development (in square feet)**

| Projection | Office | Retail | Hotel | Industrial | Institutional | Residential | Total |
|---|---|---|---|---|---|---|---|
| Existing | 2,106,499 | 646,457 | 354,814 | 961,703 | 21,878 | 6,584 | 4,097,935 |
| Baseline (2025) | 2,940,600 | 1,601,550 | See Note | 707,700 | See Note | 1,008,000 | 6,257,850 |
| Metrorail (2025) | 6,565,157 | 723,787 | 603,154 | 195,149 | 23,313 | 1,143,998 | 9,254,558 |

2025 Baseline data for the Hotel and Institutional categories is included in the Retail category.
Source: MWCOG Round 6.2 Forecasts (Baseline Only)

**Alignment T1.** Alignment T1 includes three stations: Tysons East, Tysons Central, and Tysons West. Table 5.3-14 shows the projected levels of development for the three station areas based on the guidelines provided in the Comprehensive Plan and projected market conditions.

**Table 5.3-14: Station Area Development with Alignment T1 (in square feet)**

| Projection | Office | Retail | Hotel | Industrial | Institutional | Residential | Total |
|---|---|---|---|---|---|---|---|
| Existing | 3,765,646 | 3,968,518 | 1,071,626 | 1,089,049 | 21,878 | 1,004,804 | 10,921,521 |
| Baseline (2025) | 10,281,000 | 5,629,950 | See Note | 809,200 | See Note | 2,197,500 | 18,917,650 |
| Metrorail (2025) | 15,050,520 | 4,564,073 | 1,270,112 | 195,149 | 23,313 | 3,385,527 | 24,488,694 |

2025 Baseline data for the Hotel and Institutional categories is included in the Retail category.
Source: MWCOG Round 6.2 Forecasts (Baseline Only)

**Alignments T6 and T9.** Alignments T6 and T9 both include the Tysons East, Tysons Central, Tysons Central C, and Tysons West stations; development potential associated with these two alignments would be identical. Table 5.3-15 shows the projected levels of development for the four station areas based on the guidelines provided in the Comprehensive Plan and projected market conditions. These values would also apply to Alignment T9 Design Option.

**Table 5.3-15: Station Area Development with Alignments T6 and T9 (in square feet)**

| Projection | Office | Retail | Hotel | Industrial | Institutional | Residential | Total |
|---|---|---|---|---|---|---|---|
| Existing | 5,762,995 | 4,539,603 | 1,230,147 | 1,089,049 | 23,978 | 1,306,639 | 13,952,411 |
| Baseline (2025) | 13,968,600 | 6,328,350 | See Note | 809,200 | See Note | 2,452,000 | 23,558,150 |
| Metrorail (2025) | 19,124,591 | 5,278,251 | 1,755,370 | 195,149 | 25,657 | 5,688,566 | 32,067,584 |

Note: 2025 Baseline data for the Hotel and Institutional categories is included in the Retail category.
Source: MWCOG Round 6.2 Forecasts (Baseline Only)

**Alignment T4.** Alignment T4 includes the Tysons East, Tysons Central A, Tysons Central B, Tysons Central C, and Tysons Central D, and Tysons West stations. Table 5.3-16 shows the projected levels of development for the six station areas based on the guidelines provided in the Comprehensive Plan and projected market conditions.

**Table 5.3-16: Station Area Development with Alignment T4 (in square feet)**

| Projection | Office | Retail | Hotel | Industrial | Institutional | Residential | Total |
|---|---|---|---|---|---|---|---|
| Existing | 10,064,281 | 4,605,212 | 1,650,200 | 1,089,049 | 23,978 | 3,265,580 | 20,698,300 |
| Baseline (2025) | 20,604,600 | 6,605,550 | See Note | 809,200 | See Note | 5,469,000 | 33,488,350 |
| Metrorail (2025) | 26,535,257 | 5,451,424 | 2,054,443 | 195,149 | 25,909 | 9,912,462 | 44,174,644 |

2025 Baseline data for the Hotel and Institutional categories is included in the Retail category.
Source: MWCOG Round 6.2 Forecasts (Baseline Only)

### Mid-Corridor

The Mid-Corridor section includes the Wiehle Avenue, Reston Parkway, Herndon-Monroe, and Route 28 station areas. The land use mix would be similar to the effects described in the BRT development. The stations with the most development potential are Wiehle Avenue and Route 28. The primary difference between the development potential anticipated under the BRT Alternative and the Metrorail Alternative is that more development is allowed under the Metrorail Alternative.

The methodology used to determine the actual level of development was based on the recent revisions adopted in the *Fairfax County Comprehensive Plan* for the Reston-Herndon Suburban Center. Future land use mix is projected according to the guidelines established for the four station areas at Wiehle Avenue, Reston Parkway, Herndon-Monroe, and Route 28/CIT. The actual density increase was based on the Floor Area Ratio (FAR) as defined in the plan. These densities are generally greatest in the quarter- to half-mile radius around the stations, but in some cases the highest level of density is limited to specific acreages that are directly adjacent to the transit stations. For example, in the Wiehle Avenue station area the highest density of 2.5 FAR under the Metrorail Alternative is only available for 17 acres directly adjacent to the north side of the transit station. These density restrictions are incorporated into the projections prepared for each of the station areas.

**Wiehle Avenue Station Area.** With the implementation of Metrorail at the Wiehle Avenue Station, plan options in the recently modified *Fairfax County Comprehensive Plan* allow for density bonuses dependent on achieving a certain mix of uses. At the Wiehle Avenue Station, the Comprehensive Plan allows for mixed-use development within one-quarter mile of the station. The bonus densities provided under the Metrorail Alternative are greater than those for the BRT Alternative. The plan calls for 40 to 75 percent of development to be residential with remaining development split between office, retail and hotel uses, and office uses limited to 40 percent. The land units between one-quarter and one-half mile of the station are allowed the same bonus densities provided under the BRT Alternative: a mix of 35 to 50 percent residential, up to 50 percent office, and up to 15 percent retail, with the option for hotel uses. Table 5.3-17 shows the projected levels of development for the station area based on the guidelines provided in the Comprehensive Plan and projected market conditions.

**Table 5.3-17: Wiehle Avenue Station Area Development – Metrorail Alternative (in square feet)**

| Projection | Office | Retail | Hotel | Industrial | Institutional | Residential | Total |
|---|---|---|---|---|---|---|---|
| Existing | 3,713,183 | 39,603 | 0 | 354,275 | 13,831 | 521,437 | 4,642,329 |
| Baseline (2025) | 4,880,183 | 111,034 | See Note | 266,775 | See Note | 521,437 | 5,779,429 |
| Metrorail (2025) | 5,922,252 | 476,988 | 660,325 | 0 | 0 | 4,244,065 | 11,303,630 |

2025 Baseline data for the Hotel and Institutional categories is included in the Retail category.
Source: MWCOG Round 6.2 Forecasts (Baseline Only)

**Reston Parkway Station Area.** At the Reston Parkway Station, the *Fairfax County Comprehensive Plan* allows for mixed-use development within one-quarter mile of the station to be developed. The bonus densities provided under the Metrorail Alternative are greater than those for the BRT Alternative. For areas south of the DAAR (e.g., Carr America site), the plan calls for 40 to 50 percent of development to be residential with remaining development split between office, retail, and hotel uses, and office uses limited to 40 percent. For areas north of the DAAR (e.g., TRW site), the plan calls for 50 to 60 percent of development to be residential. The land units between one-quarter and one-half mile of the station are allowed the same bonus densities provided under the BRT Alternative: a mix of 35 to 50 percent residential, up to 50 percent office, and up to 15 percent retail, with the option for hotel uses. Table 5.3-18 shows the projected levels of development for the station area based on the guidelines provided in the Comprehensive Plan and projected market conditions.

**Table 5.3-18: Reston Parkway Station Area Development – Metrorail Alternative (in square feet)**

| Projection | Office | Retail | Hotel | Industrial | Institutional | Residential | Total |
|---|---:|---:|---:|---:|---:|---:|---:|
| Existing | 4,968,936 | 360,745 | 714,495 | 0 | 0 | 995,686 | 7,039,862 |
| Baseline (2025) | 6,342,936 | 1,328,590 | See Note | 0 | See Note | 1,358,186 | 9,029,712 |
| Metrorail (2025) | 7,273,202 | 968,639 | 1,536,502 | 0 | 0 | 4,947,425 | 14,725,768 |

2025 Baseline data for the Hotel and Institutional categories is included in the Retail category.
Source: MWCOG Round 6.2 Forecasts (Baseline Only)

**Herndon-Monroe Station Area.** At the Herndon-Monroe Station, the *Fairfax County Comprehensive Plan* allows for mixed-use development immediately east of the park-and-ride facility and to the west of Monroe Street. The bonus densities provided under the Metrorail Alternative are greater than those for the BRT Alternative. The plan calls for 55 to 65 percent of development to be residential with remaining development split between office, retail, and hotel uses. The land units between one-quarter and one-half mile of the station are allowed the same bonus densities provided under the BRT Alternative, which require a mix of 35 to 50 percent residential, up to 50 percent office, and up to 15 percent retail, with the option for hotel uses. Those parcels that include the Herndon-Monroe park-and-ride facility and the Sunrise Valley Park Wildlife Habitat and Nature Preserve would not change with the implementation of Metrorail. Land uses north of the proposed station within the Town of Herndon are not anticipated to change with implementation of Metrorail based on current plans. Table 5.3-19 shows the projected levels of development for the station area based on the guidelines provided in the Comprehensive Plan and projected market conditions.

**Table 5.3-19: Herndon-Monroe Station Area Development – Metrorail Alternative (in square feet)**

| Projection | Office | Retail | Hotel | Industrial | Institutional | Residential | Total |
|---|---:|---:|---:|---:|---:|---:|---:|
| Existing | 1,396,245 | 242,876 | 0 | 374,846 | 0 | 1,376,347 | 3,390,313 |
| Baseline (2025) | 1,683,345 | 242,876 | See Note | 374,846 | See Note | 1,376,347 | 3,677,413 |
| Metrorail (2025) | 2,384,273 | 508,985 | 300,000 | 445,772 | 0 | 2,504,993 | 6,144,023 |

Note: 2025 Baseline data for the Hotel and Institutional categories is included in the Retail category.
Source: MWCOG Round 6.2 Forecasts (Baseline Only)

**Route 28 Station Area.** At the Route 28 Station, the planned density and mix of uses are the same for Metrorail as for BRT. North of the Route 28 Station, the plan allows for most of the land units within one-half mile of the station to be developed in a mixed-use fashion with a significant amount of residential use. The plan calls for 35 to 50 percent of development to be residential, up to 50 percent office, and up to 15 percent retail, with the option for hotel uses as well. South of the proposed station, the plan recommends a mix of uses including office and high-density residential, but does not quantify that mix. Table 5.3-20 shows the projected

levels of development for the station area based on the guidelines provided in the Comprehensive Plan and projected market conditions.

**Table 5.3-20: Route 28 Station Area Development – Metrorail Alternative (in square feet)**

| Projection | Office | Retail | Hotel | Industrial | Institutional | Residential | Total |
|---|---|---|---|---|---|---|---|
| Existing | 1,583,605 | 0 | 203,752 | 0 | 1,000 | 1,463,018 | 3,251,375 |
| Baseline (2025) | 2,460,827 | 264,632 | See Note | 36,694 | See Note | 1,933,996 | 4,696,119 |
| Metrorail (2025) | 7,685,970 | 1,402,973 | 890,145 | 0 | 236,179 | 6,361,586 | 16,576,853 |

2025 Baseline data for the Hotel and Institutional categories is included in the Retail category.
Source: MWCOG Round 6.2 Forecasts (Baseline Only)

### Dulles Airport

No changes in development potential are expected to result from the implementation of Metrorail at Dulles International Airport.

### Loudoun County

The Metrorail Alternative provides for increased density at the two proposed station areas in Loudoun County.

**Route 606 Station Area.** The recently adopted *Loudoun County Revised General Plan* established a TREC at the Route 606 Station area. This designation provides for the creation of a mixed-use transit node with office, light industrial and supporting uses. With the implementation of Metrorail, the maximum allowable density increases from 0.6 FAR to 2.0 FAR. Airport noise restrictions prohibit the construction of residential development in this area. Table 5.3-21 shows the projected levels of development for the station area based on the guidelines provided in the Revised General Plan and projected market conditions.

**Table 5.3-21: Route 606 Station Area Development – Metrorail Alternative (in square feet)**

| Projection | Office | Retail | Hotel | Industrial | Institutional | Residential | Total |
|---|---|---|---|---|---|---|---|
| Existing | 0 | 0 | 0 | 472,380 | 0 | 0 | 472,380 |
| Baseline (2025) | 403,174 | 39,816 | See Note | 248,130 | See Note | 0 | 691,121 |
| Metrorail (2025) | 0 | 0 | 0 | 1,646,568 | 0 | 0 | 1,646,568 |

Note: 2025 Baseline data for the Hotel and Institutional categories is included in the Retail category.
Source: MWCOG Round 6.2 Forecasts (Baseline Only)

**Route 772 Station Area.** The *Loudoun County Revised General Plan* includes plans for the development of a TOD node at the Route 772 Station. The planned TOD is a high-density node offering a full mix of uses, including residential, commercial, retail, and civic. With the implementation of Metrorail, the plan allows for an increase from 0.6 FAR and 16 dwelling units per acre to 2.0 FAR and 50 dwelling units per acre, with the highest densities closest to the station. Table 5.3-22 shows the projected levels of development for the station area based on the guidelines provided in the Revised General Plan and projected market conditions.

**Table 5.3-22: Route 772 Station Area Development – Metrorail Alternative (in square feet)**

| Projection | Office | Retail | Hotel | Industrial | Institutional | Residential | Total |
|---|---|---|---|---|---|---|---|
| Existing | 0 | 0 | 0 | 0 | 0 | 336,255 | 336,255 |
| Baseline (2025) | 2,607,238 | 362,116 | See Note | 0 | See Note | 1,064,070 | 4,033,424 |
| Metrorail (2025) | 6,518,094 | 506,963 | 0 | 0 | 0 | 2,493,914 | 9,518,971 |

Note: 2025 Baseline data for the Hotel and Institutional categories is included in the Retail category.
Source: MWCOG Round 6.2 Forecasts (Baseline Only)

#### 5.3.2.3 BRT/Metrorail Alternative

Changes to land use and development intensity in the Orange Line Connection and Tysons Corner under the BRT/Metrorail Alternative would be the same as those under the Metrorail Alternative (See Section 5.3.2.2). Changes to land use and development intensity west of Tysons Corner under the BRT/Metrorail Alternative would be the same as those under the BRT Alternative (See Section 5.3.2.1).

#### 5.3.2.4 Phased Implementation Alternative

In accordance with the Fairfax County Comprehensive Plan and Loudoun County Revised General Plan the allowable density bonuses for Metrorail would apply. Therefore changes to land use and development intensity under the Phased Implementation Alternative would be the same as the Metrorail Alternative with the following addition. The changes to land use and development intensity discussed above under the BRT Alternative for the Spring Hill Road Station would also apply.

### 5.3.3 JOINT DEVELOPMENT OPPORTUNITIES

Joint development opportunities provide benefits to the transit patrons, transit agencies, and/or the local jurisdictions. The transit patron is benefited by additional conveniences tied to the station platform or adjacent land and improved access to surrounding land uses. The transit agency or allied unit of government would control joint uses on land adjacent to the station. Joint uses potentially benefit the transit agency through increased funds and ridership resulting from the increased convenience for patrons.

Within the Dulles Corridor, both Fairfax and Loudoun counties have detailed policies that direct transit-oriented development into the station areas for the corridor. In addition, WMATA has a long-standing, proven joint development program whereby higher density development is accomplished near station areas.

WMATA has been a national leader in joint development, being one of the first transit systems in the country to establish a Joint Development Program. The historical benefits of WMATA's joint development program have included increased ridership; creation of 25,000 primary jobs; generation of over $20 million in annual property tax revenue to local jurisdictions; development of 5.6 million square feet of office space, 2.5 million square feet of retail space, almost 1,300 hotel rooms and 6,000 residential units; and a long-term revenue flow to WMATA through long-term land leases with developers.

WMATA is a partner in more than 50 public/private ventures utilizing air space over and land adjacent to Metrorail stations. The joint development sites contribute approximately $11 million annually to Metrorail funding. The forecasted growth in joint development funding is $15 million by 2003, an amount not previously achieved by any other transit system in the United States. WMATA's joint development projects are supported by the local jurisdictions through zoning and comprehensive planning procedures.

For the Dulles Corridor, many of the station areas already have facilities that have been proffered by private developers that would support the transit facility. These include such items as Kiss & Ride or bus drop-off facilities.

The Wiehle Avenue and Herndon-Monroe station areas have the greatest potential for joint development. In addition, a possible joint development is being considered for the park-and-ride lot that would be part of the Wiehle Avenue Station. Joint development at this location would incorporate mixed-use development, parking, and direct pedestrian access to the station. Joint development at this site could occur under the BRT,

Metrorail, BRT/Metrorail, and Phased Implementation alternatives that include a new median station. This joint development would be on County-owned land.

Additional transit facilities, including a bus drop-off and Kiss & Ride lot, could be provided on the north side of the Herndon-Monroe Station through a joint development program. This joint development would occur on what is now privately owned land that would need to be converted to Town land in the future.

Additional opportunities for joint development could be available as the area surrounding the outlying stations develops, particularly at the Route 28, Route 606, and Route 772 stations. Since these areas are primarily undeveloped, it is hard to project the exact potential for joint development at these stations.

# Transportation Effects 6

# 6 TRANSPORTATION EFFECTS

This chapter describes the operation of the existing and baseline transportation system in the Dulles Corridor, and presents the anticipated effects of the proposed Build Alternatives on this system. Effects were evaluated for a 2025 horizon year, as well as for the opening year of each Build Alternative.

**Section 6.1: Transportation Facilities** outlines the existing and forecast baseline conditions for the local and regional roadway networks, the corridor transit system, and other corridor transportation facilities and services, including parking, bicycle and pedestrian facilities, and air transportation.

**Section 6.2: Effects on Roadways** describes the effects of each Build Alternative, as compared to the Baseline Alternative, on the regional and local roadway network throughout the project corridor.

**Section 6.3: Effects on Transit Service** presents the transit effects associated with the Baseline and Build Alternatives, including performance relative to several measures of transit service, the projected regional and corridor ridership, and the estimated operating and maintenance costs.

**Section 6.4: Effects on Other Transportation Facilities and Services** outlines the effects of each Build Alternative on parking, bicycle and pedestrian facilities, and air transportation service.

**Section 6.5: Construction Effects** describes the construction impacts associated with the each of the Build Alternatives on the baseline transportation network, as well as the impact to the BRT Alternative during the conversion from BRT to Metrorail.

More detailed information on corridor transportation facilities, services, and operations can be found in the following technical reports for the project: *Traffic Analysis and Station Access Study* (June 2002); *Travel Demand Forecasting Methodology and Results Report* (June 2002); and T*ransit Operations and Maintenance Plan* (June 2002).

## 6.1 TRANSPORTATION FACILITIES

The regional and local transportation system serving the Dulles Corridor includes the roadway system, public transportation services, public parking facilities, bicycle facilities, pedestrian facilities, and air passenger facilities. For the Baseline Alternative, the transportation system primarily consists of existing and planned (committed in the Washington metropolitan region's financially constrained long-range plan) transportation services and facilities (a definition of the Baseline Alternative is included in Chapter 2).

The following sections identify the primary components of the corridor transportation facilities and describe the current and forecast operations and conditions of each component under the Baseline Alternative. Section 6.1.1 discusses roadways, and Section 6.1.2 covers transit services. Other transportation facilities and services are addressed in Section 6.1.3. Additional information on existing transportation facilities and assumed highway and transit improvements is provided in Chapter 2.

## 6.1.1 ROADWAYS

The Dulles Corridor is served by a number of regional and local roadway facilities, linked together by several key intersections and interchanges in areas of Falls Church, Tysons Corner, Reston-Herndon-Dulles, and eastern Loudoun County. These facilities and their operation are described in the following sections.

### 6.1.1.1 Regional Roadways

The regional highway facilities, major arterials, and key regional roadway links in the Dulles Corridor are shown in Figure 2.2-2. These highways, their existing capacity, and the improvements included in the region's financially constrained long-range transportation plan (CLRP) are described in more detail in Chapter 2. The major regional highway facilities in the corridor include the following:

- Interstate 66 (I-66);
- Dulles Connector Road;
- Interstate 495 (I-495 or Capital Beltway);
- Dulles Toll Road;
- Dulles Airport Access Road; and,
- Dulles Greenway.

The other major arterials serving regional travel patterns in the corridor include:

- Route 7 (Leesburg Pike);
- Route 123 (Chain Bridge Road/Dolly Madison Boulevard);
- Route 193 (Georgetown Pike);
- Route 7100 (Fairfax County Parkway);
- Route 28 (Sully Road);
- Route 50 (Lee Jackson Memorial Highway); and,
- Loudoun County Parkway.

#### Operations

Roadway capacity and level of service (LOS) are typically used to describe the operation of roadway facilities. LOS is a qualitative measure that describes the flow of vehicles along freeways and arterials, and the apparent ease of movement through intersections. In general, LOS represents the average delay experienced by vehicles traveling along a road or through an intersection. This delay reflects a combination of factors, such as speed, travel time, traffic interruptions, and driving comfort. In its *Highway Capacity Manual* (2000), the Transportation Research Board defines LOS characteristics and conditions for multilane highways and freeways. These characteristics are summarized in Table 6.1-1.

Six letter designations (A through F) are used to represent different levels of service. LOS A typically reflects free flow conditions, while LOS B, and LOS C are generally considered declining, but acceptable, traffic conditions. LOS D represents dense urban conditions with moderate delays. LOS E represents traffic volumes approaching the capacity of the roadway, and LOS F reflects stop-and-go, near-gridlock traffic conditions.

**Table 6.1-1: Multilane Highway and Freeway Level of Service Characteristics**

| LOS | Speed Characteristics | Multilane Highway Conditions | Freeway Conditions |
|---|---|---|---|
| A | Free-flow speeds | Uncongested or no delay | Uncongested or no delay |
| B | Free-flow speeds | Reasonably unimpeded flow<br>Presence of other vehicles a noticeable influence on ability to maneuver | Reasonably unimpeded flow<br>Maneuverability is slightly restricted |
| C | At or near free-flow speeds | Moderately congested<br>Other vehicles a strong influence, ability to maneuver is noticeably restricted | Moderately congested<br>Maneuverability is noticeably restricted, significant incidents could cause queues |
| D | Speeds are reduced moderately | Congested<br>Ability to maneuver severely restricted | Congested<br>Ability to maneuver more restricted, psychological comfort reduced, minor incidents expected to cause queues |
| E | Speeds highly variable and can be greatly reduced | Very congested<br>Queues can form readily | Very congested<br>Vehicles closely spaced, ability to maneuver severely restricted, poor psychological comfort, minor incidents will cause extensive queuing |
| F | Very low speeds, many vehicles stopped, flow likely to be stop-and-go | Severely congested, gridlock | Severely congested, gridlock |

Source: Transportation Research Board, *Highway Capacity Manual* (2000).

For analysis of freeways and multilane highways, LOS reflects the density of vehicles on the facility as well as average travel speeds. Traffic operations on multilane and arterial highways are slightly different than those on freeways because either may have traffic signals. Vehicles entering or leaving the road at intersections and driveways will affect traffic flow. Table 6.1-2 presents observed peak hour volumes and levels of service on select highway and arterial links in the corridor for 2000, as well as forecast volumes and LOS for 2010 and 2025.

**Table 6.1-2: Peak Hour Volumes and LOS on Selected Highway Links, 2000 to 2025 for Baseline Alternative**

| No. | Highway Link | 2000 | | 2010 | | 2025[1] | |
|---|---|---|---|---|---|---|---|
| | | Peak Hour Volume | LOS | Peak Hour Volume | LOS | Peak Hour Volume | LOS |
| 1 | I-66 eastbound (between Route 29 and Dulles Connector Road) | 4,900 | E | 5,900 | F | 6,900 | F |
| 2 | Dulles Connector Road westbound | 3,600 | E | 4,900 | F | 6,200 | F |
| 3 | I-495 northbound (between Route 123 and Route 7) | 7,400 | F | 7,000 | E | 7,400 | E |
| | HOV lane | n.a. | n.a. | 1,300* | D | 1,500 | D |
| 4 | Dulles Airport Access Road (DAAR) eastbound at Route 7 | 2,200 | C | 2,600 | C | 4,100 | D |
| 5 | Dulles Toll Road eastbound (between Hunter Mill Road and Reston Parkway) | 6,200 | E | 7,400* | F | 8,200* | F |
| | HOV lane | 1,200 | C | 1,200 | C | 1,160 | C |
| 6 | Route 50 westbound (between Fairfax County Parkway and Route 28) | 5,700 | E | 7,100 | F | 8,300 | F |
| 7 | Route 28 southbound (between the Dulles Toll Road and Route 606) | 3,000 | C | 5,100 | C | 6,600 | D |
| 8 | Dulles Greenway eastbound (between Route 772 and Route 659) | 3,300 | D | 6,800 | F | 8,100 | F |

* HOV lane on I-495 to be completed in 2010.
Source: 2000 Volumes – VDOT, Capital Transit Consultants. LOS and Forecast Volumes – Capital Transit Consultants (2001).

As presented in Chapter 1, population and employment growth in the project corridor is expected to result in a significant increase in travel demand. Even after planned highway improvements are implemented, this demand will lead to increasing traffic volumes and declining level of service on most roadways within the corridor.

### Travel Times

Another measure of the performance of the regional highway network is the travel time between points on the system. Table 6.1-3 summarizes current and projected future highway travel times between representative origin/destination (O/D) pairs within the Dulles Corridor, as well as between locations within the corridor and activity centers in the Washington metropolitan region.

**Table 6.1-3: A.M. Peak-Hour Highway Travel Time, 2000 – 2025 (in minutes) for Baseline Alternative**

| Origin | Destination | 2000 | 2025 | % Change |
|---|---|---|---|---|
| Tysons Corner (north) | Metro Center | 32 | 35 | 9.3 |
| Reston Town Center | Union Station | 54 | 59 | 9.3 |
| Union Station | Reston Town Center | 45 | 46 | 2.2 |
| Rosslyn | Dulles Airport | 36 | 36 | 0.0 |
| Herndon-Monroe | Pentagon | 49 | 57 | 16.3 |
| Herndon-Monroe | Tysons Corner Center | 22 | 26 | 18.2 |
| Tysons Corner (west) | Dulles Airport | 19 | 21 | 10.5 |
| Reston Town Center | Tysons Corner (east) | 23 | 25 | 8.7 |
| Reston Town Center | Dulles Airport | 11 | 12 | 9.1 |
| Metro Center | Tysons Corner (north) | 26 | 25 | -3.8 |
| Metro Center | Reston Town Center | 39 | 35 | -11.4 |

Source: Capital Transit Consultants (2001).

Highway travel times are anticipated to increase for most O/D pairs, the result of increasing traffic congestion forecast for the region. Only for the Tysons Corner/Dulles Airport pair, where most of the trip is undertaken in the widened DAAR, does travel time improve.

### 6.1.1.2 Key Intersections

In addition to regional travel functions, the roadways described above, in combination with other roads, provide local circulation within the project corridor. For local travel, intersection operations are a key performance factor.

Intersection LOS reflects the delay experienced at a signal as compared to the delay experienced during uncongested conditions. Due to the nature of intersections, travelers are bound to experience some delay at intersections; but in uncongested conditions, the average delay tends to be lower at intersections with properly timed traffic signal phasing.

For signalized intersections, the *Highway Capacity Manual* (2000) defines delay thresholds associated with each LOS. Intersection delay includes dwell (stop) time as well the time associated with acceleration and deceleration at the signal. This measure is intended to reflect driver frustration, fuel consumption, and increased travel time. The delay time represented by each LOS and a qualitative assessment of conditions under each LOS is summarized in Table 6.1-4.

**Table 6.1-4: Signalized Intersection Level of Service Characteristics**

| Level of Service | Intersection Conditions | Average Delay (seconds/vehicle) |
|---|---|---|
| A | Uncongested or no delay (Few vehicles stop) | 0 – 10 |
| B | Reasonably unimpeded flow (Some vehicles stop) | 10 – 20 |
| C | Moderately congested (Significant number of vehicles stop, possible that a few vehicles sit through cycle more than once) | 20 – 35 |
| D | Congested (Many vehicles stop, a noticeable number of vehicles sit through cycle more than once) | 35 – 55 |
| E | Very congested (Nearly all vehicles will stop, vehicles frequently have to sit through cycle more than once) | 55 – 80 |
| F | Severely congested (Gridlock) | > 80 |

Source: Transportation Research Board, *Highway Capacity Manual* (2000).

It is important to emphasize that LOS for signalized intersections represents average delay per vehicle. While individual vehicles may experience delays greater than the maximum indicated above for a given LOS, on average, the delay falls within these ranges.

Local transportation facilities and their current and forecast operation are summarized below for each of the five corridor sections.

### Orange Line Connection

The Orange Line Connection section, at the eastern end of the corridor, includes the following major local roadways:

- **Sycamore Street** – Four-lane collector road adjacent to the East Falls Church Metrorail Station, connecting residential areas of north Arlington with Falls Church.
- **Route 29 (Lee Highway)** – Two-lane east-west facility in this portion of the corridor, which serves as an alternative to I-66.
- **Haycock Road** – Four-lane minor arterial linking Route 29 and Westmoreland Street. The West Falls Church Metrorail Station entrance is off Haycock Road.
- **Great Falls Street** – Two-lane minor arterial that intersects Haycock Road and runs to the north and east of the West Falls Church Metrorail Station.

Table 6.1-5 summarizes the current and forecast operation of several key intersections proximate to the West Falls Church Metrorail Station. The Dulles Corridor Rapid Transit Project is not expected to effect traffic on the road network surrounding the East Falls Church Metrorail Station; therefore, intersections proximate to that facility are not included in this analysis.

### Tysons Corner

Tysons Corner is the primary activity center in the Dulles Corridor and second largest employment center in the Washington metropolitan region. The internal roadway network in Tysons Corner is circuitous, rather than a grid network. Vehicular access into and out of Tysons Corner is limited to six intersections and interchanges:

**Table 6.1-5: Orange Line Connection Key Intersection Analysis – 2000 to 2025 for the Baseline Alternative (delay in seconds)**

| Intersection | | 2000 | | | | 2025 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | a.m. | | p.m. | | a.m. | | p.m. | |
| | | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay |
| Leesburg Pike (Rte 7) | Haycock Road | B | 11 | B | 15 | D | 36 | D | 36 |
| Great Falls Street | Haycock Road | B | 16 | C | 24 | F | 118 | F | 108 |
| Haycock Road | West Falls Church Parking Entrance* | A | 7 | B | 11 | A | 7 | A | 7 |

* Unsignalized intersection
Source: CTC, November 2001.

- Route 123 at the Dulles Connector Road;
- I-495 and Route 123;
- Route 123 and Gosnell Road;
- Spring Hill Road at the Dulles Toll Road and DAAR;
- Route 7 at the Dulles Toll Road and DAAR; and
- Gallows Road at Old Courthouse Road.

The major local roadways within Tysons Corner are summarized below:

- **International Drive** – Six-lane north-south minor arterial linking central Tysons Corner (and two regional shopping malls) with the Dulles Toll Road.
- **Westpark Drive** – Semi-circumferential four-lane minor arterial linking Route 7 on the west with the northeast quadrant of the Tysons Corner area.
- **Tysons Boulevard** – Four to six-lane north-south local road linking the two shopping malls and providing a bypass to the International Drive/Route 123 intersection. The Tysons Boulevard/Route 123 intersection features Virginia's first three-lane left turn movement.
- **Spring Hill Road** – Two to four-lane minor arterial linking International Drive with Route 7, planned for expansion to four lanes along entire length of facility by 2005.
- **Tyco Road** – Four-lane local roadway connecting Spring Hill Road with Route 7 to the northwest.

VDOT is planning several major roadway improvements along Routes 7 and 123 in Tysons Corner. As noted in Chapter 2, improvements include the widening of Routes 7 and 123, and the construction of grade-separated interchanges at Route 7/Westpark Drive, Route 7/International Drive, and Route 123/International Drive. These improvements, which are assumed to be implemented by 2010 and are independent of the Dulles Corridor Rapid Transit Project (and thus part of the definition of the project's Baseline Alternative), are expected to significantly affect travel patterns within Tysons Corner.

Table 6.1-6 summarizes the current (2000) and forecast (2025) operation of several key intersections within Tysons Corner. Some intersections analyzed in 2000 will be improved to grade-separated interchanges by 2025, resulting in multiple intersections with ramps.

**Table 6.1-6: Tysons Corner Key Intersection Analysis – 2000 to 2025 for the Baseline Alternative (delay in seconds)**

| Intersection | | 2000 | | | | 2025 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | a.m. | | p.m. | | a.m. | | p.m. | |
| | | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay |
| Route 123 | Old Meadow Road | F | 93 | E | 79 | F | 139 | F | 88 |
| Route 123 | Colshire Drive | E | 66 | D | 51 | C | 32 | D | 35 |
| Route 123 | Anderson Road | D | 43 | E | 60 | D | 41 | C | 33 |
| Westpark Drive | Jones Branch Drive | E | 56 | B | 13 | E | 63 | C | 24 |
| Tysons Boulevard | Park Run Drive | C | 20 | C | 21 | A | 5 | A | 6 |
| International Drive | Greensboro Drive | D | 50 | D | 43 | D | 49 | E | 58 |
| International Drive | Tysons Boulevard | B | 17 | B | 19 | C | 26 | C | 23 |
| International Drive | Westpark Drive | D | 38 | C | 33 | D | 51 | E | 57 |
| Spring Hill Road | Greensboro Drive | B | 16 | B | 10 | B | 13 | B | 13 |
| Westpark Drive | Greensboro Drive | C | 30 | C | 28 | F | 154 | D | 48 |
| Route 7 SB | Route 123 EB Ramp | A | 5 | A | 5 | B | 13 | B | 13 |
| Route 7 NB | Route 123 EB Ramp | n.a. | n.a. | n.a. | n.a. | B | 17 | B | 8 |
| Route 7 SB | Route 123 WB Ramp | 11 | B | A | 8 | C | 23 | B | 21 |
| Route 7 NB | Route 123 WB Ramp | n.a. | n.a. | n.a. | n.a. | C | 22 | C | 22 |
| International Drive | Galleria Drive | C | 17 | B | 11 | A | 2 | A | A |
| Route 123 | International Drive | D | 49 | E | 68 | n.a. | n.a. | n.a. | 2.1 |
| International Drive | Route 123 EB Ramp | n.a. | n.a. | n.a. | n.a. | C | 22 | C | n.a. |
| International Drive | Route 123 WB Ramp | n.a. | n.a. | n.a. | n.a. | C | 27 | C | 31 |
| Route 123 | Tysons Boulevard | C | 33 | E | 76 | C | 29 | F | 28 |
| Tysons Boulevard | Galleria Drive | C | 29 | E | 68 | C | 33 | F | 215 |
| International Drive | Fletcher Street | C | 25 | C | 30 | D | 38 | B | 87 |
| Route 7 | International Drive | E | 64 | E | 65 | n.a. | n.a. | n.a. | 19 |
| International Drive | Route 7 NB Local Road | n.a. | n.a. | n.a. | n.a. | E | 60 | E | n.a. |
| International Drive | Route 7 SB Local Road | n.a. | n.a. | n.a. | n.a. | C | 33 | C | 56 |
| Route 7 | Dulles Toll Road EB Ramp | A | 3 | A | 6 | A | 5 | A | 32 |
| Route 7 | Dulles Toll Road WB Ramp | C | 21 | B | 11 | C | 25 | C | 4 |
| Route 7 | Tyco Road | F | 86 | F | 131 | F | 230 | F | 385 |
| Route 7 | Spring Hill Road | D | 39 | E | 64 | F | 314 | F | 467 |
| Route 7 | Westpark Drive | D | 35 | D | 52 | E | 71 | D | 42 |
| International Drive | Spring Hill Road/Jones Branch Drive | D | 44 | E | 71 | E | 71 | F | 149 |
| Spring Hill Road | Dulles Toll Road EB Ramp | C | 29 | B | 13 | D | 52 | B | 20 |
| Spring Hill Road | Dulles Toll Road WB Ramp | F | 81 | B | 17 | D | 46 | D | 36 |
| Westpark Drive | Park Run Drive | B | 18 | C | 23 | B | 17 | B | 16 |

EB = eastbound; WB = westbound
* Unsignalized intersection
Source: CTC, November 2001.

### Mid-Corridor

In the Mid-Corridor section of the Dulles Corridor, arterials and collectors generally run north-south and east-west, while the clustered residential development in the area results in circuitous local street networks. This section includes the following major local roadways:

- **Wiehle Avenue** – Two- to four-lane minor arterial currently connecting Sunrise Valley Road south of the Dulles Toll Road with Fairfax County Parkway near Route 7. Wiehle Avenue is being extended west to Dranesville Road.
- **Sunset Hills Road** – Four-lane minor arterial north of, and running parallel to, the Dulles Toll Road between Hunter Mill Road and Fairfax County Parkway.
- **Sunrise Valley Road**– Four-lane minor arterial south of, and running parallel to, the Dulles Toll Road between Hunter Mill Road and Monroe Street, where it changes names and becomes Fox Mill Road. East of Route 28, the road becomes Horsepen Road.
- **Reston Parkway** – Four- to six-lane minor arterial north-south roadway linking Reston communities with the Reston Town Center and other large developments.
- **Monroe Street/Van Buren Street** – Two- to four-lane collector connecting Herndon with western Fairfax County neighborhoods south of the Dulles Toll Road (and just west of the Herndon-Monroe Park-and-Ride lot). Monroe Street is assumed to be widened to six lanes between Sunrise Valley Drive/Fox Mill Road and Herndon Parkway by 2010.
- **Centreville Road/Elden Street** – Four-lane minor arterial connecting western Fairfax County neighborhoods south of the Dulles Toll Road with Herndon (where it is named Elden Street). A one-half mile section between Worldgate and Herndon Parkway is assumed for expansion from four to six lanes by 2010.

Table 6.1-7 summarizes the current and forecast operation of several key intersections within the Mid-Corridor section.

**Table 6.1-7: Mid-Corridor Key Intersection Analysis – 2000 to 2025 for the Baseline Alternative (delay in seconds)**

| Intersection | | 2000 | | | | 2025 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | a.m. | | p.m. | | a.m. | | p.m. | |
| | | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay |
| Dulles Toll Road – WB Ramp | Wiehle Avenue | C | 31 | D | 37 | D | 47 | B | 11 |
| Dulles Toll Road – EB Ramp | Wiehle Avenue | C | 29 | C | 29 | F | 80 | B | 12 |
| Wiehle Avenue | Entrance to Parking Facility | C | 30 | C | 28 | B | 12 | B | 18 |
| Wiehle Avenue | Sunset Hills Road | E | 60 | F | 82 | F | 102 | F | 92 |
| Wiehle Avenue | Sunrise Valley Drive | E | 64 | E | 56 | F | 145 | B | 16 |
| Dulles Toll Road – WB Ramp | Reston Parkway | D | 43 | E | 62 | F | 166 | F | 151 |
| Dulles Toll Road – EB Ramp | Reston Parkway | C | 24 | C | 23 | F | 223 | F | 196 |
| Sunset Hills Road | Reston Parkway | F | 91 | F | 80 | F | 188 | E | 75 |
| Sunrise Valley Drive | Reston Parkway | F | 175 | F | 164 | F | 231 | F | 85 |
| Town Center Parkway | Sunset Hills Road | F | 141 | F | 192 | F | 90 | E | 75 |

| Intersection | | 2000 | | | | 2025 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | a.m. | | p.m. | | a.m. | | p.m. | |
| | | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay |
| Dulles Toll Road – WB Ramp | Fairfax County Parkway | C | 23 | E | 60 | D | 35 | B | 18 |
| Dulles Toll Road – EB Ramp | Fairfax County Parkway | E | 70 | C | 20 | F | 94 | C | 25 |
| Spring Street/Sunset Hills Road | Fairfax County Parkway | F | 169 | F | 170 | F | 184 | F | 270 |
| Sunrise Valley Drive | Fairfax County Parkway | F | 111 | F | 110 | F | 230 | F | 136 |
| Spring Street/Sunset Hills Road | Herndon Parkway | F | 132 | C | 29 | B | 19 | E | 61 |
| Monroe Street/Van Buren Street | Herndon Parkway | D | 37 | E | 68 | F | 131 | F | 97 |
| Monroe Street | Sunrise Valley Drive/Fox Mill Road | E | 59 | D | 47 | F | 142 | F | 128 |
| Sunrise Valley Drive | Roark Dr (Entrance to P&R) | C | 31 | C | 31 | C | 28 | B | 15 |
| Worldgate Drive | Van Buren | B | 16 | B | 15 | B | 15 | B | 18 |
| Worldgate Drive | Centreville Road | C | 29 | D | 37 | D | 39 | C | 32 |
| Dulles Toll Road – WB Ramp | Centreville Road | D | 53 | F | 145 | E | 76 | E | 64 |
| Dulles Toll Road – EB Ramp | Centreville Road | D | 45 | C | 22 | F | 210 | E | 68 |
| Fox Mill Road | Centreville Road | D | 37 | D | 42 | C | 34 | F | 101 |
| Herndon Parkway | Centreville Road | F | 93 | F | 405 | F | 99 | F | 113 |

EB = eastbound; WB = westbound
Source: CTC, November 2001.

### Dulles Airport

Dulles Airport is located southwest of the interchange for the Dulles Toll Road/DAAR, the Dulles Greenway, and Route 28. These roadways converge at Dulles Airport, and access to the airport is provided through a diamond interchange with loop access to the eastbound and westbound Dulles Toll Road/DAAR. Flyover access from northbound Route 28 is provided to Dulles Airport.

### Loudoun County

The Loudoun County section, at the western end of the corridor, is rural in nature, with limited commercial and residential development and an equally limited local road network. Local roadways within the Loudoun County portion of the Dulles Corridor are identified below:

- **Route 606** – Four-lane arterial connecting southeastern Loudoun County with Herndon and northern Fairfax County.
- **Route 789** – Two-lane local road connecting Route 606 with Moran Road. Route 789 is planned for widening to four lanes and an extension north to Ashburn by 2010.
- **Route 772** – Two-lane local road running south from the Dulles Greenway.

Table 6.1-8 summarizes the current and forecast operation of the single key intersection in the Loudoun County section of the corridor.

**Table 6.1-8: Loudoun County Key Intersection Analysis – 2000 to 2025 for the Baseline Alternative (delay in seconds)**

| Intersection | | 2000 | | | | 2025 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | a.m. | | p.m. | | a.m. | | p.m. | |
| | | LOS | Delay | LOS | Delay | LOS | Delay | LOS | Delay |
| Route 606 | Route 789* | B | 20 | B | 20 | F | 345 | F | 137 |

* Unsignalized intersection, 2000
Source: CTC, November 2001.

### 6.1.2 TRANSIT SERVICES

The major transit facilities and services in the Dulles Corridor include existing and planned bus routes, fixed guideway facilities, and bus transit centers. Figure 2.2-1 provides a map of the baseline transit network in the Dulles Corridor. These facilities and their current and future operations are described in the following section. Information on bus and rail service is organized by provider, and includes service levels (geographic coverage, span of service, frequencies), ridership, and system operations and maintenance costs. Current and forecast transit travel time between representative locations is provided. Significant bus transit centers within the corridor are also identified and described. Additional information on the proposed transit route patterns and service levels for the Baseline Alternative is presented in the *Transit Operations and Maintenance Plan* (March 2002).

#### 6.1.2.1 Washington Metropolitan Area Transit Authority (WMATA)

WMATA is the metropolitan Washington region's primary public transportation provider. WMATA was created under an interstate compact in 1967 to plan, finance, construct, and operate a regional rail and bus transit system. As discussed in Chapter 1, WMATA's service area stretches nearly 1,500 square miles, through an area containing approximately 3.2 million people. Systemwide, WMATA carried approximately 571,000 weekday passengers on its 103-mile regional Metrorail system, and provided over 484,000 unlinked trips on its 322-route Metrobus system in 2000. System operations and maintenance costs in 2000 were $673.3 million.

Metrorail runs from 5:30 a.m. to midnight Monday through Thursday, 5:30 a.m. to 2 a.m. on Friday, 8 a.m. to 2 a.m. on Saturday, and 8 a.m. to midnight on Sunday. The span of Metrobus service is variable depending on the route.

**Metrorail**

The Metrorail Orange Line serves the southeastern quadrant of the Dulles Corridor. Specifically, four stations are located in the corridor: East Falls Church, West Falls Church, Dunn Loring, and Vienna. Orange Line service currently operates with six-car trains on six-minute headways in the peak period, and four-car trains with 12-minute headways in the off-peak period (headways or service frequencies are defined as the time between train or bus arrivals at a given station/stop). In addition, supplemental service is provided in the peak hour between West Falls Church and New Carrollton (the eastern terminus of the Orange Line). Ten trains depart from the West Falls Church yard in the a.m. peak hour and travel to the New Carrollton yard. These same trains depart from New Carrollton in the p.m. peak hour and return to the West Falls Church yard. This supplemental service results in three-minute service frequencies in the peak hour, peak direction of travel. Four-car trains are currently used on the supplemental peak-hour train trips.

Beginning in 2015, WMATA plans that the supplemental peak hour service will be replaced with a Metrorail line operating in both directions between West Falls Church and the Stadium-Armory stations during the four-

hour morning and evening peak periods. This line would operate at six-minute headways, resulting in a combined three-minute service frequency between West Falls Church and Stadium-Armory.

Forecast demand for Orange Line services in 2025 requires eight-car train consists during peak periods on the Vienna service, and a mixture of six and eight car trains on the supplemental peak period service. This increased capacity is required to meet future demand even without the Dulles Corridor Rapid Transit Project. The enhancement of Metrorail's baseline operating capacity is addressed in Chapter2 *Definition of Alternatives*.

Current and forecast boardings at each of the project corridor's existing Metrorail stations are provided in Table 6.1-9.

**Table 6.1-9: Average Weekday Boardings for Orange Line Stations in the Dulles Corridor – 2000 to 2025 for Baseline Alternative**

| Metrorail Orange Line Station | 2000 | 2025 |
|---|---|---|
| East Falls Church | 3,600 | 7,600 |
| West Falls Church | 6,200 | 13,500 |
| Dunn Loring | 4,400 | 6,300 |
| Vienna | 9,900 | 11,300 |

Source: 2000 data – WMATA. 2025 Data – CTC, November 2001.

### Metrobus and Metroaccess

WMATA currently operates 14 bus routes in the Dulles Corridor; most of this service is oriented toward Tysons Corner from areas to the east and south. In general, Metrobus service feeds the four Orange Line stations in the corridor or the Ballston-Marymount and Rosslyn stations on the Orange Line, located just east of the corridor.

Most Metrobus routes are long radial and cross-town routes that, because of their length, are often several minutes behind schedule by the time they reach the Tysons Corner area. Traffic congestion in the area further contributes to route delays. Consequently, WMATA is implementing several route changes and initiating new routes. It is assumed that WMATA service will continue to primarily feed Orange Line stations, although services between Bethesda and Tysons Corner, and downtown Washington, D.C. and Dulles Airport would also continue to operate.

WMATA also provides demand-response Metroaccess paratransit service throughout the Washington metropolitan region. Metroaccess provides curb-to-curb service to persons with disabilities who cannot use regular public transportation and have been certified eligible to use paratransit service. Metroaccess provided 510,000 trips to qualifying passengers in 2000. Paratransit operations constituted approximately two percent of WMATA's total fiscal year 2000 operating budget. Metroaccess service is provided through contract with local operators.

### 6.1.2.2 Fairfax County

Fairfax County served an average of 20,500 passengers each weekday in 2000 on its 54 Fairfax Connector bus routes. These routes operate primarily within the confines of the county, but also provide direct connections into Falls Church, Arlington, and Alexandria. In addition, Fairfax County operates the Reston Internal Bus Service (RIBS), which provides four loop circulators within the Reston-Herndon area. Most Fairfax County bus routes operate weekdays between 5:30 a.m. and 8 p.m., and between 8 a.m. and 8 p.m. on weekends; limited routes extend evening hours of operation to midnight.

The Fairfax County Department of Community and Recreation Services operates FASTRAN paratransit service throughout the County and the cities of Fairfax and Falls Church. In addition to transporting residents registered for Metroaccess ADA service, FASTRAN provides dial-a-ride service to income-eligible Fairfax County residents for medical appointments and essential shopping trips.

The County operates 30 fixed routes within the Dulles Corridor, including express bus service operating in the DAAR and Dulles Toll Road, and feeder bus and circulator services operating within Tysons Corner, Reston, and Herndon. Fairfax Connector currently operates approximately 166,600 bus revenue hours annually in the corridor, with a peak-period requirement of 65 buses. This service represents a significant increase over 1999 service levels (65,000 hours of annual revenue service, 43 peak-period buses). In 2000, Fairfax Connector ridership in the corridor was approximately 8,100 average weekday passengers; current ridership is estimated at 12,000 average weekday boardings.

Fairfax County is in the process of expanding service within the Dulles Corridor. Most improvements are anticipated to be initiated by the end of fiscal year 2002. These assumed enhancements include increased express bus service between existing park-and-ride facilities (Reston East, Reston South, and Herndon-Monroe) and Tysons Corner, West Falls Church, and the Pentagon, as well as improved feeder and circulator services throughout Reston, Herndon, and Tysons Corner.

Operating statistics for current, planned, and assumed Fairfax County transit service in the Dulles Corridor is provided in Table 6.1-10. Additional measures and statistics, as well as ridership data, which reflect forecast baseline transit service, are presented in Section 6.3.

**Table 6.1-10: Bus Service Operating Statistics for Fairfax County Service in the Dulles Corridor – 2000 to 2025 for the Baseline Alternative**

| Service Statistic | 2000 | 2025 |
|---|---:|---:|
| O&M Costs | $9,029,000 | $13,605,000 |
| Annual Revenue Hours | 166,400 | 250,500 |
| Peak Bus Requirement | 60 | 91 |

Source: 2000 data – Fairfax County, 2025 data – CTC, November 2001.

#### 6.1.2.3 Loudoun County

Loudoun County provides express bus service to Rosslyn and the Pentagon, as well as to the State Department and other locations in downtown Washington, D.C. In 2000, 11 daily inbound trips were made in the morning peak period (6 a.m. to 8 a.m.) and eleven outbound trips were made in the evening peak period (4 p.m. to 6 p.m.). Yellow Transportation is the contract operator for the county. This service averaged about 750 weekday passengers.

In August 2001, VDOT opened the 750-space Dulles North Transit Center near Route 606 and the Dulles Greenway in eastern Loudoun County. Most inbound express bus service originates or stops at this transit center. In October 2001, Loudoun County added two additional buses between the transit center and downtown Washington, D.C., resulting in a total of 13 peak-period express runs.

Loudoun County envisions a graduated transit service expansion over a period of several years. Future improvements include additional peak-period express bus service with stops at the Tysons-West*Park Transit Station and West Falls Church Metrorail Station, and new feeder/circulator service between Leesburg, Ashburn, Sugarland Run, the Cascades, and the Dulles North Transit Center.

Operations and maintenance cost estimates and other operating statistics for this service are provided in Table 6.1-11. Additional measures, statistics, and ridership data, which reflect forecast baseline transit service, are presented in Section 6.3.

**Table 6.1-11: Bus Operating Statistics for Loudoun County Service in the Dulles Corridor – 2000 to 2025 for the Baseline Alternative**

| Service Statistic | 2000 | 2025 |
|---|---:|---:|
| O&M Costs | $1,620,000 | $3,649,000 |
| Annual Revenue Hours | 18,600 | 46,700 |
| Peak Bus Requirement | 11 | 25 |

Source: 2000 data – Loudoun County, 2025 data – CTC, November 2001.

#### 6.1.2.4 Other Transit Services

Aside from fixed route and paratransit service provided by WMATA and each of the counties, a few other transit services operate in the corridor. The Potomac and Rappahannock Transportation Commission—which operates the VRE Commuter Rail service between Northern Virginia and Washington, D.C.—also provides weekday commuter bus service between Manassas and Washington, D.C., with an hourly stop at the West Falls Church Metrorail Station. The City of Falls Church initiated its electric bus service in late 2000 with two circulator routes linking the East and West Falls Church Metrorail stations with Seven Corners and several Falls Church locations. The City of Fairfax's City-Energy-University service provides limited fixed-route service between the Vienna/Fairfax-GMU Metrorail Station, George Mason University, and other locations in Fairfax City.

Loudoun Transit is a private not-for-profit operator providing limited fixed route bus service in Leesburg and advance registration on-demand transportation in Leesburg and the Sterling area. Loudoun Transit will be initiating demonstration reverse-commute bus service into Washington, D.C. under an FTA job access and reverse commute grant in 2002.

Washington Flyer Coach Service is operated by the Metropolitan Washington Airports Authority (MWAA) and provides scheduled shuttle service between Dulles Airport and the West Falls Church Metrorail Station every half-hour. Direct hourly scheduled coach and shuttle service is also offered between Dulles Airport and Ronald Reagan Washington National Airport (National Airport).

#### 6.1.2.5 Bus Transit Centers

An important element of existing and near-term planned transit service in the Dulles Corridor is its network of bus transit centers and park-and-ride lots. Each of these facilities is identified and described in Table 6.1-12. Facilities that also provide parking are described in further detail in Section 6.4. Figure 6.1-1 presents the location of the park-and-ride facilities and bus transit centers within the corridor. The Tysons-West*Park Transit Station is the primary bus transfer facility for Tysons Corner, particularly for express bus service and other travel to and from the north, west, and east. In addition, the small on-street facility on the ring road of the Tysons Corner Center shopping mall serves as a transfer point for internal trips and trips oriented south of Tysons Corner.

**Table 6.1-12: Bus Transit Facilities in the Dulles Corridor**

| Bus Transit Centers | Location | Owner/ Operator | No. of Bays | Kiss & Ride | Parking | Connecting Services |
|---|---|---|---|---|---|---|
| East Falls Church Metrorail Station | I-66 at Sycamore Drive, Arlington | WMATA | 8 | Yes | Yes | Metrobus |
| West Falls Church Metrorail Station (south side) | I-66 at Route 7, Falls Church | WMATA | 8 | Yes | Yes | Metrobus, Private Shuttles |
| West Falls Church Metrorail Station (north side) | I-66 at Route 7, Falls Church | WMATA | 7 | No | Yes | Metrobus, Fairfax Connector, Washington Flyer |
| Tysons Corner Center Bus Stop | Tysons Center Ring Road, south side of mall | Tysons Corner I | 4 | No | No | Metrobus, Fairfax Connector |
| Tysons-West*Park Transit Station | 8300 Jones Branch Road, McLean | Fairfax County | 10 | Yes | No | Metrobus, Fairfax Connector |
| Reston East | 1860 Wiehle Avenue, Reston | Fairfax County | 8 | Yes | Yes | Fairfax Connector, RIBS, Private Shuttles |
| Reston North (overflow parking for Reston East) | Sunset Hills Road at Wiehle Avenue, Reston | VDOT | 2 | No | Yes | Fairfax Connector, RIBS |
| Reston South | Reston Parkway at Fox Mill Road, Reston | Fairfax County | 3 | Yes | Yes | Fairfax Connector, RIBS |
| Reston Town Center | Explorer Street between Market Street and Bluemont Way, Reston | Fairfax County | 2 | No | No | Fairfax Connector, RIBS |
| Herndon-Monroe | 1230 Sunrise Valley Drive, Herndon | Fairfax County | 8 | Yes | Yes | Fairfax Connector, RIBS |
| Dulles North Transit Center | Route 606 at Route 789, Loudoun County | VDOT | 6 | Yes | Yes | Loudoun County Express Bus |

Source: CTC, November 2001.

### 6.1.2.6 Transit Travel Times

Table 6.1-13 provides morning peak-hour transit travel times for representative origin-destination pairs within the region. The times shown are the sum of in- and out-of-vehicle travel time. In-vehicle time is the time spent traveling in a transit vehicle. Out-of-vehicle time typically includes time spent accessing the station or stop, waiting for the transit vehicle, and transferring between transit vehicles.

**Table 6.1-13: A.M. Peak-Hour Transit Travel Time – 2000 to 2025 for the Baseline Alternative (in minutes)**

| Origin | Destination | 2000 | 2025 | % Change |
|---|---|---|---|---|
| Tysons Corner (north) | Metro Center | 45 | 37 | (17.7) |
| Reston Town Center | Union Station | 61 | 57 | (6.6) |
| Union Station | Reston Town Center | 78 | 78 | 0.0 |
| Rosslyn | Dulles Airport | 63 | 64 | 1.6 |
| Herndon-Monroe | Pentagon | 57 | 50 | (12.3) |
| Herndon-Monroe | Tysons Corner Center | 41 | 42 | 2.4 |
| Tysons Corner (west) | Dulles Airport | 73 | 72 | (1.4) |
| Reston Town Center | Tysons Center (east) | 43 | 46 | 7.0 |
| Reston Town Center | Dulles Airport | 48 | 44 | (8.3) |
| Metro Center | Tysons Corner (north) | 41 | 36 | (12.1) |
| Metro Center | Reston Town Center | 58 | 47 | (19.0) |

Reductions in travel time by 2025 result from decreasing wait times and transfers resulting from assumed increases in express and local bus service.
Source: CTC, 2001.

Transit travel times are expected to improve for most origin-destination pairs. For trips within the Dulles Corridor, reductions in travel times are the result of assumed increases in express and local bus service. For trips originating or ending outside of the corridor, travel time decreases reflect improvements to both Fairfax Connector and Metrorail service levels assumed by 2025.

## 6.1.3 OTHER TRANSPORTATION FACILITIES AND SERVICES

### 6.1.3.1 Parking

As noted in Section 6.1.2.5, several public park-and-ride facilities are located within the Dulles Corridor. Table 6.1-14 identifies each of the public parking facilities designed to facilitate use of public transportation and/or ridesharing in the corridor.

**Table 6.1-14: Park-and-Ride Facilities in the Dulles Corridor**

| Park-and-Ride Facilities | | Owner/ Operator | Daily Cost | Number of Spaces | Usage Rate (2000) | Connecting Services |
|---|---|---|---|---|---|---|
| 1 | East Falls Church Metrorail Station | WMATA | $2.25 | 385 | 100.0% | Metrobus |
| 2 | West Falls Church Metrorail Station | WMATA | $2.25 | 1,037 | 100.0% | Metrobus, Fairfax Connector, Washington Flyer |
| 3 | West Falls Church Metrorail Station (overflow parking) | Virginia Tech/ University of Virginia | $2.25 | 275 | 100.0% | Metrobus, Fairfax Connector, Washington Flyer |
| 4 | Reston East | Fairfax County | Free | 827 (2,300)* | 100.0% | Fairfax Connector, RIBS |
| 5 | Reston North (overflow parking for Reston East) | VDOT | Free | 320 | 28.4% | Fairfax Connector, RIBS |
| 6 | Reston South | Fairfax County | Free | 400 | 42.3% | Fairfax Connector, RIBS |
| 7 | Herndon-Monroe | Fairfax County | Free | 1,745 | 47.2% | Fairfax Connector, RIBS |
| | **Total Capacity** | | | **4,989 (6,462)*** | | |

See Figure 6.1-1 for locations
* Planned by Year 2025
Source: WMATA, Fairfax County, and CTC.

Except for the two overflow facilities, each of the park-and-ride lots also provides Kiss & Ride areas. In the Baseline Alternative, it is assumed that the Reston East Park-and-Ride at Wiehle Avenue will expand to 2,300 spaces by 2010, resulting in a baseline parking capacity of 6,462 spaces through 2025. A park-and-ride structure at West Falls Church Station is also being planned by Fairfax County and WMATA. No other changes to the existing park-and-ride lots in the corridor are anticipated.

Non-transit-related parking systems in the Dulles Corridor are typical of other suburban environments. Off-street parking is provided at most major office complexes and retail facilities within the corridor. Surface parking is most typical. Structured parking is increasing, particularly in Tysons Corner. Reston Town Center also contains large multi-level parking garages. Parking is generally free at office and retail developments within the corridor. However, some businesses in Tysons Corner are beginning to charge employees for parking as the value of these spaces increases. It is expected that the amount of paid parking in Tysons Corner will continue to increase. Dulles Airport is currently building 8,500 parking spaces as part of its six-year expansion plans (see Section 6.1.3.3).

### 6.1.3.2 Bicycle and Pedestrian Facilities

The pedestrian environment varies within the corridor. Most roads in Tysons Corner have sidewalks, although the character of existing development and topography discourage walking. Residential areas in Reston are typically served by a system of trails linking neighborhood clusters. Commercial areas are generally equipped with adequate pedestrian facilities to support internal circulation, although pedestrian linkages between developments are usually poor. Eastern Loudoun County is less developed, and there are currently no pedestrian facilities within proposed station areas. A detailed inventory of pedestrian facilities in the corridor is provided in the *Traffic Analysis and Station Access Study* (June 2002).

The Dulles Corridor includes approximately 25 miles of the 45-mile Washington & Old Dominion Railroad Regional Park (commonly known as the W&OD Trail, and shown in Figure 6.1-2). The park consists of a 100-foot wide right-of-way reserved for recreational use, and extends from just west of Interstate 395 in south Arlington to Purcellville in central Loudoun County. Within the corridor, the W&OD Trail runs along I-66 adjacent to the East Falls Church Metrorail Station and continues west through Falls Church, Vienna, and Reston. The trail crosses the DAAR and Dulles Toll Road just east of Wiehle Avenue and runs parallel to Sunset Hills Road through the Reston Town Center area. The trail continues northwest through Herndon, Sterling, and Ashburn.

No major new pedestrian facilities are planned in the corridor through 2025.

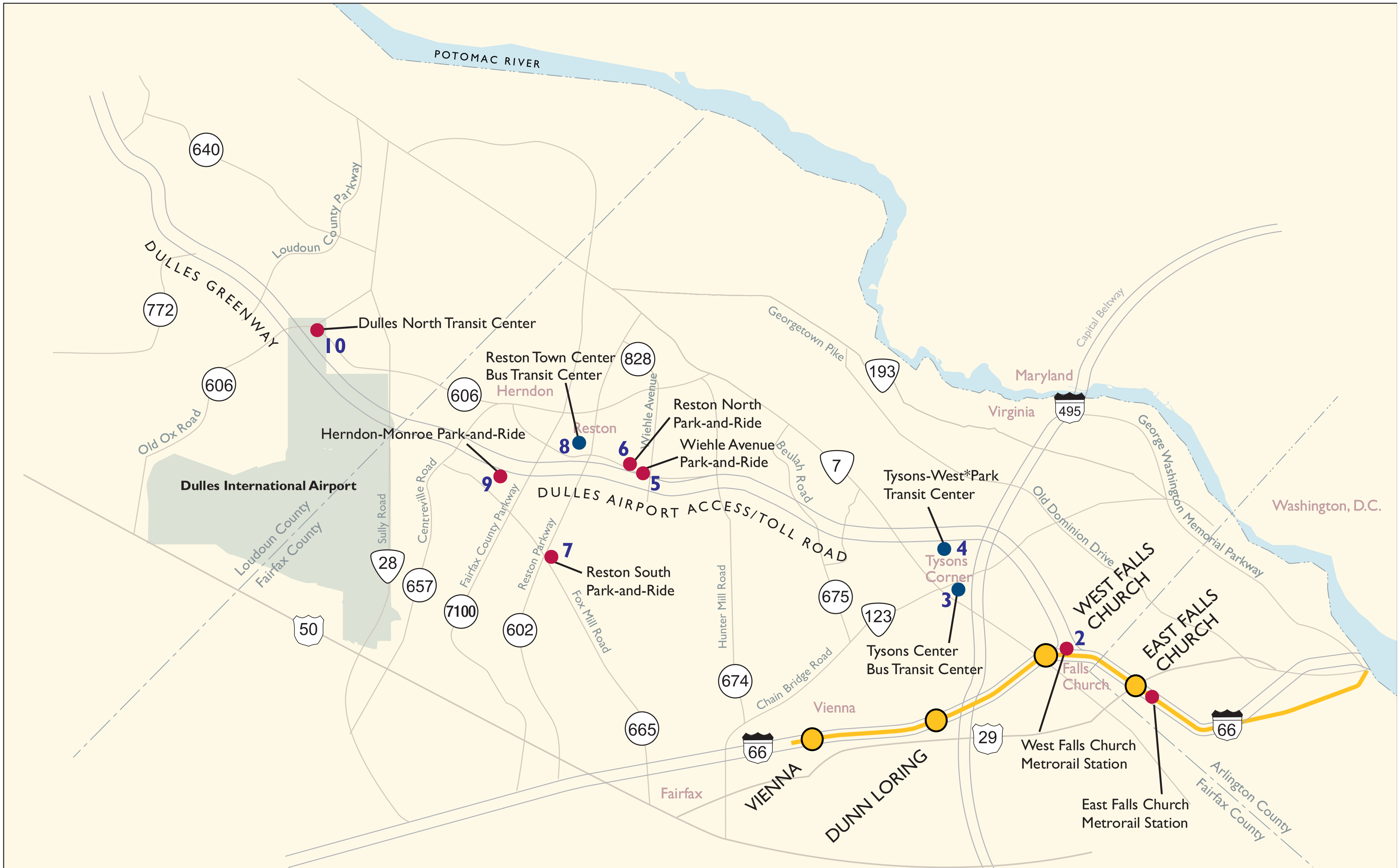
### 6.1.3.3 Air Transportation

Dulles Airport is located in eastern Loudoun County and western Fairfax County, just west of Route 28 and south of the Dulles Greenway. Ground access to Dulles Airport is currently provided primarily via the DAAR and Route 28. According to MWCOG's *Washington-Baltimore Regional Air Passenger Survey* (1998), access by private vehicle to Dulles Airport has been declining as a share of total flight originations, but the total number of vehicle trips to the airport has increased. In addition, the use of taxis and airport shuttles and buses, provided through the privately contracted Washington Flyer service, has increased dramatically. Table 6.1-15 provides information on mode of access to Dulles Airport and to all three of the region's major airports (Dulles Airport, National Airport, and Baltimore-Washington International Airport (BWI) in Maryland) for the years 1987 and 1998.

**Table 6.1-15: Mode of Access, Dulles Airport and All Major Airports in Region, 1987 to 1998 (thousands of originations)**

| Mode of Access | Dulles Airport | | | | All Major Airports in Region | | | |
|---|---|---|---|---|---|---|---|---|
| | 1987 | % | 1998 | % | 1987 | % | 1998 | % |
| Private Car | 2,127 | 61 | 2,549 | 47 | 6,127 | 47 | 8,081 | 44 |
| Rental Car | 616 | 18 | 839 | 15 | 1,747 | 14 | 2,734 | 15 |
| Taxi | 368 | 11 | 875 | 16 | 2,905 | 22 | 3,535 | 19 |
| Metrorail (National Airport) | – | – | – | – | 1,025 | 8 | 801 | 4 |
| LRT/Commuter Rail (BWI) | – | – | – | – | 10 | 0 | 138 | 1 |
| Airport Bus/Limo | 170 | 5 | 618 | 11 | 456 | 4 | 1,892 | 10 |
| Hotel/Motel Courtesy Bus | 57 | 2 | 516 | 10 | 377 | 3 | 1,250 | 7 |
| Other | 129 | 4 | 39 | 1 | 277 | 2 | 95 | 1 |
| **TOTAL** | **3,467** | **100** | **5,444** | **100** | **12,924** | **100** | **18,526** | **100** |
| Non-Respondents | 127 | | 80 | | 419 | | 318 | |
| Total Originations | 3,594 | | 5,525 | | 13,343 | | 18,844 | |

Source: MWCOG Survey (2001)




LEGEND

County Boundary

Existing Orange Line Metrorail and Stations

Bus Transit Center

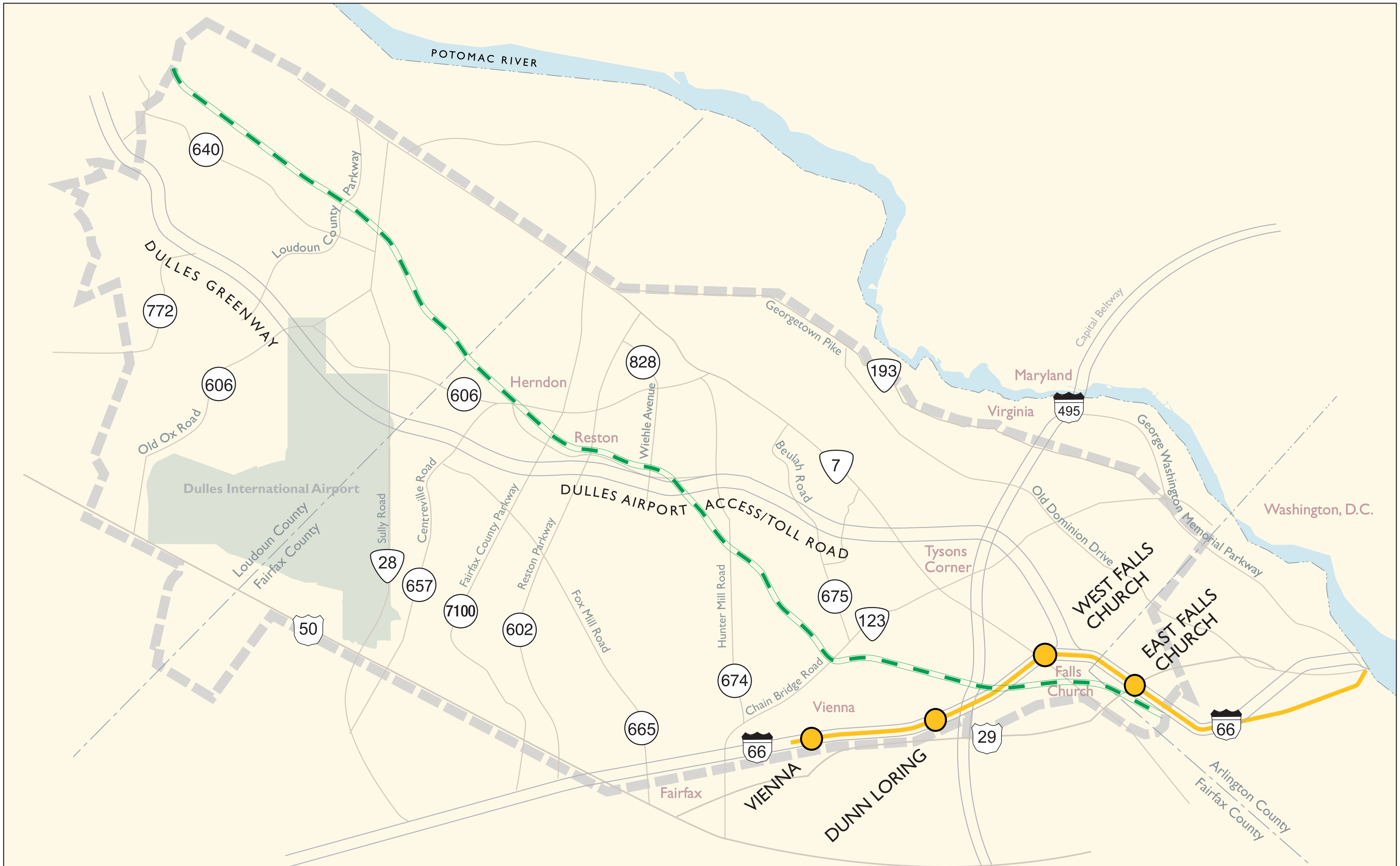
Park-and-Ride

0 1 2 3 MILES

Figure 6.1-1

## Transit Centers and Park-and-Ride Lots

Dulles Corridor
Rapid Transit Project




LEGEND

- Washington and Old Dominion Railroad Regional Park
- Dulles Corridor Boundary
- County Boundary
- Existing Orange Line Metrorail and Stations

0 1 2 3 MILES

Figure 6.1-2

# Washington and Old Dominion Railroad Regional Park Within the Dulles Corridor

Dulles Corridor
Rapid Transit Project

Dulles Airport is the region's largest air passenger facility, and one of the largest and fastest growing airports in the world. Dulles Airport served 20.1 million passengers (an average of 55,000 a day) on nearly 454,000 commercial, general aviation, and commuter flights in 2000. Passenger traffic has increased 56 percent since 1996. In addition, Dulles Airport is currently undergoing a six-year, $3.4 billion program of improvements to increase air and landside capacity (including the construction of 8,500 new parking spaces). MWAA plans to add a third lane in both directions of the DAAR sometime after 2010. It is anticipated that air passenger service will eventually reach 55 million annually when all planned facilities are built by 2035. Employment at the airport is expected to reach 60,000 that same year.

## 6.2 EFFECTS ON ROADWAYS

The anticipated effects of the Baseline and Build alternatives on the regional and corridor roadways were estimated using the Northern Virginia Major Investment Study Model. The model was based on regionally adopted population and land use data, future highway and transit networks, transit operating plans developed for the project, and a variety of other model inputs. For travel demand forecasting and traffic analysis purposes, Alignment T6, T9, and T9 Design Option were treated as one alignment (Alignment T6/T9) because the station locations for Alignment T6 are identical to those for Alignment T9 and T9 Design Option, except that Tysons Central C is an underground station for T6 and an above-ground station for T9 and T9 Design Option.

Travel demand forecast results are based on the MWCOG's Round 6.2 Cooperative Land Use Forecasts. The Round 6.2 forecasts represent the regionally adopted population and employment forecasts, through 2025, for the metropolitan Washington area, including Fairfax and Loudoun counties. By federal regulation, such regionally approved land use forecasts must be used in the travel demand analysis of each alternative studied in an EIS. More specifically, model assumptions regarding socioeconomic variables and land use must be consistent among alternatives so as to not bias the results of the travel demand forecasting process.

Subsequent to the adoption of the Round 6.2 Forecasts, Fairfax and Loudoun counties amended their comprehensive plans to permit additional residential, retail, and office development around Metrorail stations in Tysons Corner, and around BRT stops and Metrorail stations in Reston, Herndon and Loudoun County. These amendments, and their projected impact on corridor population and employment levels, are discussed in detail in Chapter 3. In order to assess the potential effects of this allowable development on traffic and transit ridership in the Dulles Corridor, population and employment forecasts reflecting increased land use densities around Metrorail stations in Tysons Corner and the Mid-Corridor area were used as the basis for a supplemental series of 2025 travel demand analyses of each Metrorail alignment. Forecast increases in corridor transit ridership and station area traffic were generated by the additional development are noted in this analysis. Full analytical results are presented in the *Traffic Analysis and Station Access Study Technical Report* (June 2002) and the *Secondary and Cumulative Effects Technical Report* (June 2002).

The following sections describe the effects of the Build Alternatives and phased implementation on traffic volumes and traffic flow in the region and the corridor, as compared to the Baseline Alternative. Section 6.2.1 outlines the general methodology applied in traffic analysis, while Sections 6.2.2 through 6.2.4 summarize the results of analysis. Particular attention is given to local traffic operations in the vicinity of proposed stations. The effects of the Build Alternatives are presented for 2025, while the effects of phased implementation are discussed relative to the performance of each alternative in its opening year. For those locations where substantial roadway impacts are anticipated, potential mitigation measures are recommended (Section 6.2.5).

More detailed information on the traffic analysis process and results, including forecast data for the opening year (phased implementation) analyses, are included in the *Traffic Analysis and Station Access Study* (June 2002). The detailed results of the highway travel time analysis and other traffic analyses are provided in the *Travel Demand Forecasting and Methodology and Results Report* (June 2002) and its appendix.

### 6.2.1 METHODOLOGY

The regional and local traffic analysis data presented in the following sections is shown for the individual Build Alternatives as a whole, rather than by alignment. A review of the modeled 2025 highway assignments and forecast vehicle-miles-traveled for each Build Alternative found very little difference in the level of corridor traffic associated with their alignment variations (less than two-tenths of one percent). In other words, although there are some noticeable differences between the traffic volumes estimated for the BRT Alternative and the Metrorail Alternative, BRT 1 does not typically have significantly different effects on overall corridor traffic patterns than BRT 2 or BRT 3, and Alignment T1 would not generate vastly different levels of traffic than Alignment T6/T9 or Alignment T4. Therefore, subsequent analysis of the traffic data to determine level of service and intersection delay was performed for only one alignment for each alternative. Forecast traffic volumes were modified, where necessary, to reflect the BRT and Metrorail alignments with the greatest level of park-and-ride, Kiss & Ride, or feeder bus activity at stations (i.e. the “worst case” impact was used). The BRT/Metrorail Alternative analysis was carried out assuming the combination of BRT 1 and Alignment T6/T9. The Phased Implementation Alternative would result in the same effects as the Metrorail Alternative in 2025. Metrorail would be the final phase of this alternative.

Much of the traffic analysis presented in the following section is for the a.m. and p.m. peak hour. These "peak" hours represent the single 60-minute period at a given location where traffic is assumed to be highest, not a common hour for the entire region or corridor. For example, the a.m. peak hour in an area characterized predominantly by residential uses may be earlier than the a.m. peak hour in a major employment center, as home-based work traffic leaves a residential area at the home end of the trip and arrives later at an employment center at the work end of the trip.

### 6.2.2 REGIONAL HIGHWAY OPERATIONS

The 2025 peak-hour volumes and levels of service (LOS) on selected highway links throughout the Dulles Corridor are shown in Table 6.2-1 for the Baseline and Build Alternatives. The data for the Baseline Alternative is repeated from Section 6.1.1 for comparison purposes.

The 2025 traffic volumes for the Build Alternatives are comparable to the 2025 baseline volumes, with the majority of the link volumes only slightly decreasing for the Build Alternatives. Only volumes on the DAAR decrease enough to result in an improved level of service. On the Dulles Toll Road, it is expected that the additional parking capacity in the corridor associated with each of the Build Alternatives will attract a significant park-and-ride market, resulting in higher traffic volumes on the facility.

To determine the effects associated with phased implementation, the level of service for the regional highways was evaluated in each alternative’s opening year. As with the 2025 results, the 2005 BRT, 2006 BRT/Metrorail, and 2010 Metrorail alternatives were found to have a negligible impact on baseline regional highway volumes. Given that the change in traffic volumes is small, it is expected that the increase in transit ridership associated with the Build Alternatives would have very little effect on vehicle-trip reduction at the regional level. However, implementation of any of the Build Alternatives would increase overall transportation

capacity in the corridor, permitting the movement of more people without providing for additional highway capacity. An analysis of this "passenger throughput" of each alternative is provided in Section 10.1.1.

**Table 6.2-1: Peak-Hour Traffic Volumes and Levels of Service on Selected Highway Links – 2025**

| Highway Link | Location | Baseline | | BRT | | Metrorail | | BRT/ Metrorail | | Phased Implementation | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | LOS | Peak-Hour Volume | LOS | Peak-Hour Volume | LOS | Peak-Hour Volume | LOS | Peak-Hour Volume | LOS | Peak-Hour Volume |
| I-66 EB | Route 29 to Dulles Connector Road | F | 6,900 | F | 6,900 | F | 6,900 | F | 6,900 | F | 6,900 |
| Dulles Connector Road WB | | F | 6,200 | F | 5,600 | F | 5,700 | F | 5,600 | F | 5,700 |
| I-495 NB | Route 7 to Route 123 | E | 7,800 | E | 7,700 | E | 7,700 | E | 7,700 | E | 7,700 |
| | HOV lane | D | 1,500 | D | 1,500 | D | 1,500 | D | 1,500 | D | 1,500 |
| Dulles Airport Access Road EB | At Route 7 | D | 4,100 | C | 3,700 | C | 3,800 | C | 3,800 | C | 3,800 |
| Dulles Toll Road EB | Hunter Mill Road to Reston Parkway | F | 7,100 | F | 7,400 | F | 7,300 | F | 7,200 | F | 7,300 |
| | HOV lane | C | 1,200 | C | 1,100 | C | 1,200 | C | 1,200 | C | 1,200 |
| Route 50* | Fairfax County Parkway and Route 28 | F | 8,300 | F | 8,200 | F | 8,300 | F | 8,300 | F | 8,300 |
| Route 28* | Dulles Toll Road and Route 606 | D | 6,600 | D | 6,500 | D | 6,600 | D | 6,500 | D | 6,600 |
| Dulles Greenway EB | Route 772 to Route 659 | F | 8,100 | F | 8,100 | F | 8,100 | F | 8,100 | F | 8,100 |

*Direction not specified by VDOT.

### 6.2.3 TRAVEL TIMES

As stated in Section 6.1.1, regional roadway travel times are another indicator of highway performance. Current (2000) travel times for select origin-destination (O/D) pairs and forecast (2025) travel times for the Baseline Alternative are shown in Table 6.1-3. Similar travel time analyses performed for each Build Alternative—for 2025 and for their opening years—indicate that the Dulles Corridor Rapid Transit Project would not result in changes to regional highway travel times.

### 6.2.4 LOCAL TRAFFIC OPERATIONS

Projected delays at key intersections in the corridor and the corresponding LOS were assessed for 2025 to determine the anticipated effects of the Build Alternatives on local traffic operations. All intersection delay has been rounded to the nearest whole number. Similarly, traffic effects under the proposed phased implementation schedule were evaluated by examining the estimated opening-year delay and LOS for each Build Alternative.

Given the large number of key intersections in the Dulles Corridor, the results of the local traffic analysis are presented below by geographic corridor section. Intersections operating at LOS D or better were considered to perform at an acceptable level of service, which is consistent with Fairfax County and VDOT guidelines for signalized intersections. Intersections that performed at LOS E or LOS F under the Build Alternatives were determined to warrant mitigation if the delay time for the intersection was more than the delay experienced under the baseline condition by the greater of either five (5) seconds (or more) or five (5) percent greater than the baseline delay. In other words, delay at an LOS E or F intersection has to increase <u>at least five (5) seconds</u> to warrant mitigation; however, mitigation might not be required at an intersection with a delay increase of 15 or 20 seconds if that intersection experiences high levels of delay in the baseline condition. For example, if intersection delay increased from 385 seconds to 400 seconds, no mitigation was recommended because this 15-second increase is not greater than 5 percent of the baseline delay.

### 6.2.4.1 Orange Line Connection

Table 6.2-2 provides the a.m. and p.m. peak-hour LOS and delay for analyzed intersections in the Orange Line Connection section of the corridor. These intersections are adjacent to the existing West Falls Church Metrorail Station. No formal traffic analysis was performed for intersections in the vicinity of the East Falls Church Metrorail Station. Currently, the station's 400-space park-and-ride lot is full by 8 a.m. on most weekdays. With no increase in parking assumed for the future, and no changes in peak period Metrorail frequencies, it is not anticipated that the Build Alternatives would generate additional traffic in and around the East Falls Church Station.

WMATA, in conjunction with Fairfax County, is planning a park-and-ride structure for the West Falls Church Station at its existing station facilities. While this project would be independent of the Dulles Corridor Rapid Transit Project, it was considered in the Baseline Alternative.

**Table 6.2-2: Orange Line Connection Peak-Hour Intersection LOS and Delay – 2025 (delay in seconds)**

| Primary Roadway/ Cross Street | Baseline | | BRT | | Metrorail | | BRT/Metrorail | | Phased Implementation | |
|---|---|---|---|---|---|---|---|---|---|---|
| | a.m. LOS/ Delay | p.m. LOS/ Delay | a.m. LOS/ Delay | p.m. LOS/ Delay | a.m. LOS/ Delay | p.m. LOS/ Delay | a.m. LOS/ Delay | p.m. LOS/ Delay | a.m. LOS/ Delay | p.m. LOS/ Delay |
| Route 7/ Haycock Road | D/36 | D/36 | C/27 | C/32 | C/24 | C/28 | C/32 | C/26 | C/24 | C/28 |
| Haycock Road/ West Falls Church Station Parking Entrance | A/7 | A/7 | A/6 | A/8 | A/7 | A/8 | A/8 | A/6 | A/7 | A/8 |
| Great Falls Street/Haycock Road | F/118 | F/108 | F/120 | <u>F/123</u> | F/106 | F/104 | F/115 | <u>F/117</u> | F/106 | F/104 |

Underlined items meet the threshold at which mitigation should be considered.

#### BRT Alternative

For the BRT Alternative, the entrance to the park-and-ride facility would continue to operate at LOS A in the p.m. peak hour, while operations at the Route 7/Haycock Road intersection would improve to LOS C in the p.m. peak hour. These improvements are likely the result of a reduction in parking demand at the West Falls Church Station caused by the addition of transit parking in Tysons Corner and the Mid-Corridor. In the baseline condition, Metrorail users living north and west of Falls Church would drive to the West Falls Church Station; however, many of these patrons would be able to access the regional transit system at park-and-ride facilities closer to their homes under any of the Build Alternatives.

Though some traffic operations in the Orange Line Connection section are forecast to improve for the BRT Alternative, the delay at Great Falls Street/Haycock Road is expected to increase slightly in the p.m. peak hour. This could be the result of residents living east of the West Falls Church Station taking advantage of the decreased demand for parking described above.

### Metrorail Alternative

The effects associated with the Metrorail Alternative are similar to those for the BRT Alternative. However, the Metrorail Alternative would result in less delay at the Great Falls Street/Haycock Road intersection than the Baseline and BRT alternatives.

### BRT/Metrorail Alternative

Traffic operations at intersections surrounding the West Falls Church Station for the BRT/Metrorail Alternative would be similar to operations for the BRT and Metrorail alternatives. Delay at the Great Falls Street/Haycock Road intersection would be less than that experienced for the BRT Alternative, but more than that for the Metrorail Alternative.

### Phased Implementation Alternative

The effects associated with the Phased Implementation Alternative would be identical to those of the Metrorail Alternative in 2025, as Metrorail would be the final phase of this alternative. Opening year operations for each Build Alternative were evaluated to show the effects of phasing transit improvements for the Route 7/Haycock Road intersection and the entrance to the West Falls Church park-and-ride lot. The analysis demonstrated that there would be no significant trend in effects on baseline traffic conditions resulting from phased implementation of the project; the analyzed intersections would continue to operate at an acceptable level of service under each phase.

## 6.2.4.2 Tysons Corner

Table 6.2-3 presents the projected LOS and delay for key intersections in the Tysons Corner section of the project corridor.

**Table 6.2-3: Tysons Corner Peak-Hour Intersection LOS and Delay – 2025 (delay in seconds)**

| Intersection | Baseline | | BRT I | | Metrorail | | BRT/ Metrorail | | Phased Implementation | |
|---|---|---|---|---|---|---|---|---|---|---|
| | a.m. LOS/ Delay | p.m. LOS/ Delay | a.m. LOS/ Delay | p.m. LOS/ Delay | a.m. LOS/ Delay | p.m. LOS/ Delay | a.m. LOS/ Delay | p.m. LOS/ Delay | a.m. LOS/ Delay | p.m. LOS/ Delay |
| **Tysons East Station** | | | | | | | | | | |
| Route 123/ Old Meadow Road | F/139 | F/88 | n.a. | n.a. | F/154 | E/77 | F/162 | F/90 | F/154 | E/77 |
| Route 123/ Colshire Drive | C/32 | D/35 | n.a. | n.a. | E/76 | E/72 | F/85 | E/76 | E/76 | E/72 |
| Colshire Drive/ Station Entrance | n.a. | n.a. | n.a. | n.a. | B/10. | B/12 | B/10 | B/12 | B/10. | B/12 |
| Route 123/ Anderson Road | D/41 | C/33 | n.a. | n.a. | D/47 | D/36 | E/56 | C/27 | D/47 | D/36 |
| **Tysons Central A Station** | | | | | | | | | | |
| Westpark Drive/ Jones Branch Drive | E/63 | C/24 | n.a. | n.a. | E/56 | C/22 | D/53 | B/18 | E/56 | C/22 |
| Tysons Boulevard/Park Run Drive | A/5 | A/6 | n.a. | n.a. | A/4 | A/6 | A/5 | A/7 | A/4 | A/6 |
| **Tysons Central B Station** | | | | | | | | | | |
| International Drive/ Greensboro Drive | E/57 | E/59 | n.a. | n.a. | D/50 | E/59 | E/57 | E/60 | D/50 | E/59 |
| International Drive/ Tysons Boulevard | C/27 | C/24 | n.a. | n.a. | C/24 | C/24 | C/26 | C/24 | C/24 | C/24 |

| Intersection | Baseline | | BRT 1 | | Metrorail | | BRT/ Metrorail | | Phased Implementation | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **a.m. LOS/ Delay** | **p.m. LOS/ Delay** | **a.m. LOS/ Delay** | **p.m. LOS/ Delay** | **a.m. LOS/ Delay** | **p.m. LOS/ Delay** | **a.m. LOS/ Delay** | **p.m. LOS/ Delay** | **a.m. LOS/ Delay** | **p.m. LOS/ Delay** |
| International Drive/ Westpark Drive | D/54 | E/59 | n.a. | n.a. | D/54 | E/57 | E/62 | E/58 | D/54 | E/57 |
| Spring Hill Road/ Greensboro Drive | B/14 | B/17 | n.a. | n.a. | B/14 | B/16 | B/10 | B/16 | B/14 | B/16 |
| Westpark Drive/ Greensboro Drive | F/155 | D/48 | n.a. | n.a. | F/136 | D/42 | F/159 | C/34 | F/136 | D/42 |
| Tysons Central C Station | | | | | | | | | | |
| Route 7 SB Ramp/ Local Road/ Route 123 EB Ramp/Local Road | B/13 | B/14 | n.a. | n.a. | B/14 | B/13 | B/13 | B/14 | B/14 | B/13 |
| Route 7 NB Ramp/ Local Road Route 123 EB Ramp/Local Road | B/17 | B/18 | n.a. | n.a. | B/17 | B/17 | B/17 | B/17 | B/17 | B/17 |
| Route 7 SB Ramp/ Local Road Route 123 WB Ramp/Local Road | C/23 | B/21 | n.a. | n.a. | C/22 | B/20 | C/22 | B/20 | C/22 | B/20 |
| Route 7 NB Ramp/ Local Road/ Route 123 WB Ramp/Local Road | C/22 | C/22 | n.a. | n.a. | C/21 | C/21 | C/21 | C/21 | C/21 | C/21 |
| Route 7 SB Local Road/ Westpark Drive | E/71 | D/42 | n.a. | n.a. | E/57 | D/36 | E/69 | D/37 | E/57 | D/36 |
| Route 7 NB Local Road/Westpark Drive | E/62 | D/38 | D/48 | D/35 | D/48 | C/32 | D/48 | C/34 | D/48 | C/32 |
| Tysons Central Station | | | | | | | | | | |
| International Drive/ Galleria Drive | A/2 | A/2 | n.a. | n.a. | A/2 | A/2 | A/2 | A/2 | A/2 | A/2 |
| International Drive/ Route 123 EB Ramp/Local Road | C/22 | C/31 | n.a. | n.a. | C/22 | C/28 | C/22 | C/29 | C/22 | C/28 |
| International Drive/ Route 123 WB Ramp/Local Road | C/27 | C/29 | n.a. | n.a. | C/27 | C/29 | C/27 | C/29 | C/27 | C/29 |
| Route 123/Tysons Boulevard | C/29 | F/215 | n.a. | n.a. | D/35 | F/185 | D/35 | F/185 | D/35 | F/185 |
| Tysons Boulevard/ Galleria Drive | C/33 | F/87 | n.a. | n.a. | C/34 | F/82 | C/32 | F/85 | C/34 | F/82 |
| International Drive/ Fletcher Street | D/40 | B/20 | n.a. | n.a. | D/41 | C/20 | D/46 | B/20 | D/41 | C/20 |
| International Drive/ Route 7 SB Local Road | C/33 | C/32 | n.a. | n.a. | C/33 | C/31 | C/33 | C/31 | C/33 | C/31 |
| International Drive/ Route 7 NB Local Road | E/60 | E/56 | n.a. | n.a. | E/59 | D/55 | E/59 | D/55 | E/59 | D/55 |
| Tysons West Station | | | | | | | | | | |
| Route 7/Dulles Toll Road EB Ramp | A/5 | A/4 | A/4 | A/6 | A/7 | A/5 | A/8 | A/7 | A/7 | A/5 |
| Route 7/ Dulles Toll Road WB Ramp | C/25 | C/25 | C/23 | C/21 | D/41 | C/28 | C/26 | C/27 | D/41 | C/28 |
| Route 7/Tyco Road | F/230 | F/385 | F/219 | F/400 | F/235 | F/401 | F/237 | F/401 | F/235 | F/401 |
| Route 7/Station Entrance | n.a. | n.a. | n.a. | n.a. | A/2 | D/47 | A/2 | D/39 | A/2 | D/47 |
| Tyco Road/Station Entrance | n.a. | n.a. | n.a. | n.a. | B/13 | B/19 | B/11 | B/10 | B/13 | B/19 |
| Route 7/Spring Hill Road | F/314 | F/467 | F/281 | F/470 | F/292 | F/478 | F/293 | F/474 | F/292 | F/478 |
| Spring Hill Road Station/Tysons-West*Park Transit Station | | | | | | | | | | |
| International Drive/Spring Hill Road/ Jones Branch Drive | E/67 | F/153 | <u>E/75</u> | <u>F/226</u> | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| Jones Branch Drive/Station Entrance | B/13 | E/69 | B/14 | <u>F/98</u> | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| Spring Hill Road/Dulles Toll Road EB Ramp | E/56 | C/21 | E/56 | C/21 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| Westpark Drive/Park Run Drive | B/17 | B/16 | B/17 | B/16 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| Spring Hill Road/ Dulles Toll Road WB Ramp | D/48 | D/37 | D/48 | D/37 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |

n.a. = not applicable
Underlined items meet the threshold at which mitigation should be considered.

### BRT Alternative

For the BRT Alternative, traffic effects were assessed for intersections in the vicinity of the existing Tysons-West*Park Transit Station and the roadway that BRT vehicles would use to access the station.

Increases in Kiss & Ride and feeder bus activity are expected at the Tysons-West*Park Transit Station for all three BRT alignments. For BRT 2 and BRT 3, BRT vehicles accessing the transit center would also have effects on traffic operations. The projected effect of this additional activity in 2025 is deterioration in the level of service over the baseline condition at Jones Branch Drive intersections.

Though the Tysons West Station would not exist under the BRT Alternative, traffic operations at intersections near this proposed Metrorail station would be affected under BRT 2 and BRT 3. For these alignments, BRT vehicles would travel along Route 7, Tyco Road, and Spring Hill Road en route to (and returning from) the Tysons-West*Park Transit Station. Compared to the Baseline Alternative, traffic operations for the BRT Alternative would improve slightly at all Route 7 intersections, except at Tyco and Spring Hill Roads, where delay would increase somewhat in the p.m. peak hour.

### Metrorail Alternative

The Tysons East and Tysons West stations are expected to generate a considerable amount of vehicle activity (park-and-ride and/or Kiss & Ride) in the a.m. and p.m. peak hours. This station-related traffic would negatively affect the operation of adjacent roadways and contribute to longer queues on Routes 7 and 123 near these stations. As a result, the intersections at Route 123/Old Meadow Road, Route 123/Colshire Drive, Route 7/Tyco Road, and Route 7/Spring Hill Road are projected to operate at LOS E or F during one or both peak periods in 2025. It is also anticipated that there would be substantial queuing along Colshire Drive, particularly in the p.m. peak hour, due to lack of sufficient Kiss & Ride capacity at Tysons East Station. This congestion would exacerbate the delays forecast for the Route 123/Colshire Drive intersection.

The high levels of delay experienced at these intersections near the Tysons East and Tysons West stations, could discourage potential transit patrons from attempting to access the stations, thus reducing ridership on the transit system.

The relocation of the access to the storage facility site behind the proposed Tysons West would cause traffic entering the storage site to use the proposed entrance to the station on Tyco Road. This new traffic pattern, however, is not expected to worsen levels of service at the proposed station entrance on Tyco Road. Displacements and relocation are discussed in more detail in Chapter 3.0.

No significant deterioration in operations is expected elsewhere in Tysons Corner. Under VDOT's planned improvements, the local frontage roads along Routes 123 and 7 would operate similarly under both the Baseline and Metrorail alternatives.

Marginal improvements are projected for many intersections. For example, the Route 7/Westpark Drive intersection near the Tysons Central C Station is projected to experience reduced traffic volumes and moderate decreases in delay, especially during the a.m. peak hour. These improvements are likely the result of increased transit use by employees of businesses in the vicinity of the Tysons Central C Station and a lack of park-and-ride and Kiss & Ride facilities at this station.

As noted at the beginning of Section 6.2, the potential ridership and traffic effects associated with the Metrorail Alternative were assessed for a scenario in which the Dulles Corridor experiences additional rail-related

development, as permitted under the *Fairfax County Comprehensive Plan*. It was determined that under this transit-related development scenario, traffic within Tysons Corner would increase an average of 2.5 percent over the volumes evaluated above, in both the a.m. and p.m. peak hours. In the vicinity of proposed stations, traffic volumes are expected to be even higher.

#### BRT/Metrorail Alternative

The impacts of the BRT/Metrorail Alternative would be similar to those of the Metrorail Alternative. The main differences are that the BRT/Metrorail Alternative would result in shorter delays at the Westpark Drive/Jones Branch Drive intersection (near Tysons Central A Station) than either the Baseline or Metrorail alternatives, and there would be no change in operations at the intersection of International Drive and the Route 123 westbound ramp (near Tysons Central Station).

#### Phased Implementation Alternative

The effects of the Phased Implementation Alternative would be identical to those of the Metrorail Alternative in 2025. In general, traffic conditions in Tysons Corner would continue to with the opening of each phase of the project; however, this decline is due largely to forecast growth in employment and population in the area, and not the Dulles Corridor Rapid Transit Project. Exceptions are near the Spring Hill Road Station/Tysons-West*Park Transit Station, Tysons East Station, and Tysons West Station. BRT-related congestion near the Tysons-West*Park facility is expected to occur in 2005, and Metrorail-related congestion at Tysons East and Tysons West stations would begin in 2006.

### 6.2.4.3 Mid-Corridor

Table 6.2-4 provides the estimated LOS and delay for key intersections located within the Wiehle Avenue, Reston Parkway, Herndon-Monroe, and Route 28 station areas.

**Table 6.2-4: Mid-Corridor Peak Hour Intersection LOS and Delay – 2025**

| Intersection | Baseline | | BRT | | Metrorail | | BRT/ Metrorail | | Phased Implementation | |
|---|---|---|---|---|---|---|---|---|---|---|
| | a.m. LOS/ Delay | p.m. LOS/ Delay | a.m. LOS/ Delay | p.m. LOS/ Delay | a.m. LOS/ Delay | p.m. LOS/ Delay | a.m. LOS/ Delay | p.m. LOS/ Delay | a.m. LOS/ Delay | p.m. LOS/ Delay |
| **Wiehle Avenue Station** | | | | | | | | | | |
| Wiehle Avenue/ Dulles Toll Road WB Ramp | D/47 | B/11 | D/51 | B/13 | D/44 | B/13 | D/43 | B/12 | D/44 | B/13 |
| Wiehle Avenue/ Dulles Toll Road EB Ramp | F/80 | B/12 | F/83 | B/15 | F/80 | B/18 | E/78 | B/17 | F/80 | B/18 |
| Wiehle Avenue/ Entrance to Reston East parking Facility | B/12 | B/18 | C/30 | C/30 | C/29 | C/23 | C/28 | C/24 | C/29 | C/23 |
| Wiehle Avenue/ Sunset Hills Road | F/101 | F/97 | <u>F/109</u> | E/78 | <u>F/129</u> | <u>F/81</u> | <u>F/117</u> | F/83 | <u>F/129</u> | <u>F/81</u> |
| Wiehle Avenue/ Sunrise Valley Drive | F/145 | B/16 | F/150 | <u>E/68</u> | F/151 | <u>E/73</u> | F/152 | <u>E/68</u> | F/151 | <u>E/73</u> |
| **Reston Parkway Station** | | | | | | | | | | |
| Reston Parkway/ Dulles Toll Road WB Ramp | F/166 | F/151 | <u>F/179</u> | <u>F/162</u> | <u>F/180</u> | <u>F/165</u> | F/172 | F/157 | <u>F/180</u> | <u>F/165</u> |
| Reston Parkway/ Dulles Toll Road EB Ramp | F/223 | F/196 | F/225 | <u>F/222</u> | F/229 | <u>F/220</u> | F/179 | <u>F/221</u> | F/229 | <u>F/220</u> |
| Reston Parkway/ Sunset Hills Road | F/188 | E/75 | F/155 | <u>F/109</u> | F/169 | <u>F/109</u> | F/190 | <u>F/109</u> | F/169 | <u>F/109</u> |

| Intersection | Baseline | | BRT | | Metrorail | | BRT/ Metrorail | | Phased Implementation | |
|---|---|---|---|---|---|---|---|---|---|---|
| | a.m. LOS/ Delay | p.m. LOS/ Delay | a.m. LOS/ Delay | p.m. LOS/ Delay | a.m. LOS/ Delay | p.m. LOS/ Delay | a.m. LOS/ Delay | p.m. LOS/ Delay | a.m. LOS/ Delay | p.m. LOS/ Delay |
| Reston Parkway/ Sunrise Valley Drive | F/231 | F/85 | F/232 | F/109 | F/230 | F/104 | F/235 | F/101 | F/230 | F/104 |
| Reston Parkway/ Town Center Parkway | F/90 | E/75 | F/100 | F/103 | F/90 | F/106 | F/93 | F/109 | F/90 | F/106 |
| Sunset Hills Road/ Future North Station Entrance | n.a. | n.a. | B/15 | A/6 | B/16 | A/6 | B/17 | A/6 | B/16 | A/6 |
| Edmund Haley Drive/ Future South Station Entrance | n.a. | n.a. | B/11 | B/11 | B/11 | B/11 | B/11 | B/11 | B/11 | B/11 |
| **Herndon-Monroe Station** | | | | | | | | | | |
| Fairfax County Parkway/ Dulles Toll Road – WB Ramp | D/35 | B/18 | C/24 | E/71 | C/23 | E/69 | C/26 | E/70 | C/23 | E/69 |
| Fairfax County Parkway/ Dulles Toll Road – EB Ramp | F/94 | C/25 | F/83 | C/34 | F/81 | D/37 | F/82 | C/34 | F/81 | D/37 |
| Fairfax County Parkway/ Spring Street/Sunset Hills Road | B/13 | B/16 | B/19 | B/14 | B/13 | B/15 | B/13 | B/14 | B/13 | B/15 |
| Fairfax County Parkway/ Sunrise Valley Drive | F/230 | F/136 | F/201 | F/178 | F/202 | F/180 | F/204 | F/177 | F/202 | F/180 |
| Herndon Parkway/ Spring Street/Sunset Hills Road | B/19 | E/61 | C/22 | D/37 | C/22 | D/53 | C/22 | D/33 | C/22 | D/53 |
| Herndon Parkway/ Monroe Street/Van Buren Street | F/131 | F/97 | F/147 | F/202 | F/146 | F/194 | F/152 | F/200 | F/146 | F/194 |
| Sunrise Valley Drive/ Monroe Street | F/142 | F/128 | F/189 | F/200 | F/189 | F/189 | F/192 | F/196 | F/189 | F/189 |
| Sunrise Valley Drive/ Roark Drive (H-M Park-and-Ride Entrance) | C/25 | C/27 | F/84 | F/247 | E/67 | F/224 | E/73 | F/156 | E/67 | F/224 |
| Worldgate Drive/ Van Buren Street | B/15 | B/18 | B/19 | C/20 | B/18 | B/19 | B/20 | B/19 | B/18 | B/19 |
| **Route 28 Station** | | | | | | | | | | |
| Centreville Road/ Worldgate Drive | D/39 | C/32 | E/56 | E/57 | D/47 | E/60 | E/59 | D/48 | D/47 | E/60 |
| Centreville Road/ Dulles Toll Road – WB Ramp | E/76 | E/64 | F/85 | E/61 | F/82 | E/65 | F/83 | E/66 | F/82 | E/65 |
| Centreville Road/ Dulles Toll Road – EB Ramp | F/210 | E/68 | F/230 | E/74 | F/225 | E/71 | F/229 | E/70 | F/225 | E/71 |
| Centreville Road/Sunrise Valley Drive | D/49 | E/79 | D/50 | F/80 | D/51 | E/80 | D/53 | E/79 | D/51 | E/80 |
| Sunrise Valley Drive/ South Station Entrance | n.a. | n.a. | A/8 | B/15 | B/15 | C/21 | A/8 | B/17 | B/15 | C/21 |
| Herndon Parkway/Centreville Road | F/99 | F/110 | F/113 | F/148 | F/107 | F/197 | F/109 | F/139 | F/107 | F/197 |

n.a. = not applicable
Underlined items meet threshold at which mitigation should be considered.

### BRT Alternative

Park-and-ride demand at the Wiehle Avenue, Herndon-Monroe, and Route 28 stations is expected to result in increased traffic volumes, increased delay, and declining levels of service at intersections in the vicinity of the stations. Similarly, Kiss & Ride activity near the Reston Parkway Station is projected to cause deterioration in levels of service at surrounding intersections. For many intersections, the increased delay may be substantial enough to warrant mitigation.

For the Wiehle Avenue, Reston Parkway, and Herndon-Monroe stations, the worst deterioration in intersection performance would occur in the p.m. peak hour. Mitigation should be considered for the Wiehle Avenue/Sunrise Valley Drive intersection (near Wiehle Avenue Station); all existing intersections in the vicinity of the Reston Parkway Station; the Fairfax County Parkway/Dulles Toll Road westbound ramp intersection; and for intersections along Sunrise Valley Drive and Monroe Street near the Herndon-Monroe Station.

At intersections surrounding the Route 28 Station, traffic operations for the BRT Alternative would be worse than those for the Baseline Alternative, except at the Centreville Road/Sunrise Valley Drive intersection. Intersections would typically experience greater increases in delay during the a.m. peak hour, and mitigation would be warranted.

### Metrorail Alternative

In general, traffic conditions in the vicinity of stations under the Metrorail Alternative would be as bad as, or worse than, conditions under the BRT Alternative. In nearly all cases, delays for the Metrorail Alternative are higher than in the baseline condition, especially in the p.m. peak hour.

For intersections in the vicinity of Wiehle Avenue Station, increases in delay would be greater and deterioration in the level of service would be more noticeable for the Metrorail Alternative than for the BRT Alternative. Mitigation should be considered for the Wiehle Avenue/Sunrise Valley Drive intersection, as well as for the Wiehle Avenue/Sunset Hills Road intersection, especially for the p.m. peak hour.

For nearly all intersections surrounding the Reston Parkway and Herndon-Monroe stations, delay in the p.m. peak hour would increase over that for the Baseline Alternative. Like the BRT Alternative, operations under the Metrorail Alternative would warrant mitigation along Sunrise Valley Drive and Monroe Street, as well as at the Fairfax County Parkway/Dulles Toll Road westbound ramp intersection.

At the intersections surrounding the Route 28 Station, particularly those on Centreville Road, delay in the a.m. peak hour would worsen over that for the Baseline Alternative, even with the planned Centreville Road capacity improvements. These increased delays would warrant mitigation.

For the transit-related development scenario, traffic volumes within the Mid-Corridor area would increase, and congestion-related delay would be even worse than that discussed above. Specifically, in the vicinity of the Wiehle Avenue and Reston Parkway stations, Metrorail-related development is forecast to generate approximately six percent more traffic in the a.m. peak period and seven percent more traffic in the p.m. peak period. In the Herndon-Monroe and Route 28 station areas, traffic would increase by over 8 percent in the a.m. peak period and 10 percent in the p.m. peak period. These increases in traffic are average increases for the local roadway network within approximately one-mile of the Dulles Toll Road.

### BRT/Metrorail Alternative

In the Mid-Corridor section, impacts on traffic operations associated with the BRT/Metrorail Alternative would be similar to those for the BRT Alternative.

### Phased Implementation Alternative

The traffic effects associated with the Phased Implementation Alternative would be identical to those of the Metrorail Alternative in 2025. Traffic conditions would generally continue to worsen with the opening of each phase of the project. At the Route 28 Station, this decline is due largely to forecast growth in employment and population in the area. At intersections near Reston Parkway, Kiss & Ride activity at new station facilities is

expected to worsen traffic conditions. Similarly, the expansion of existing facilities at Wiehle Avenue (by 2005) and Herndon-Monroe (by 2010) would attract project-related park-and-ride and Kiss & Ride activity, causing nearby intersection performance to deteriorate.

#### 6.2.4.4 Dulles Airport

A formal traffic analysis was not performed for the Dulles Airport section of the corridor because the proposed station/stop at the airport would not have any project-related park-and-ride, Kiss & Ride, or feeder bus activity.

BRT vehicles serving the airport are not expected to have significant effects on regular traffic operations at the airport. BRT service to the airport terminal would replace the existing Washington Flyer service (two buses per hour) with articulated BRT vehicles operating in a circular loop along Aviation, Cargo, and Wind Sock Drives, and the commercial vehicle roadway in front of the terminal. BRT service would result in a net increase of 3 vehicles per hour for BRT 1, 11 vehicles per hour for BRT 2, and 16 vehicles per hour for BRT 3.

For BRT 1 and BRT 2, several routes would require "turnback" operations that would use airport roadways north of the terminal. For routes originating/ending at DAAR median stations, BRT vehicles would need to turn around at the end of their routes to resume service. At the western end of the DAAR, vehicles would exit the westbound DAAR at Rudder Road and then travel along Autopilot and Aviation Drives before returning to the eastbound DAAR. During turnback operations, vehicles would not carry passengers. In the peak hour, turnback operations would consist of 60 BRT vehicles for BRT 1 and 62 vehicles for BRT 2.

#### 6.2.4.5 Loudoun County

Table 6.2-5 provides the projected LOS and delay for key intersections located near the Route 606 and Route 772 station/stop areas. Because a final site for the Route 772 Station/Stop has yet to be determined, analysis was performed for proposed facilities on both the north and south sides of the Dulles Greenway. Access is assumed to be provided by a new road connecting to the existing Route 772.

**Table 6.2-5: Loudoun County 2025 Peak Hour Intersection LOS and Delay – Route 606 and Route 772 Stations/Stops**

| Intersection (delay in seconds) | Baseline | | BRT | | Metrorail | | BRT/Metrorail | | Phased Implementation | |
|---|---|---|---|---|---|---|---|---|---|---|
| | a.m. LOS/ Delay | p.m. LOS/ Delay | a.m. LOS/ Delay | p.m. LOS/ Delay | a.m. LOS/ Delay | p.m. LOS/ Delay | a.m. LOS/ Delay | p.m. LOS/ Delay | a.m. LOS/ Delay | p.m. LOS/ Delay |
| Route 606 Station/Stop | | | | | | | | | | |
| Route 606/Route 789 | F/345 | F/137 | F/283 | F/216 | F/454 | F/185 | F/254 | F/213 | F/454 | F/185 |
| Route 789/ North Station Entrance | n.a. | n.a. | B/14 | B/20 | B/19 | B/12 | B/18 | B/15 | B/19 | B/12 |
| South Station Entrance | n.a. | n.a. | A/7 | B/12 | B/11 | B/17 | B/14 | B/13 | B/11 | B/17 |
| Route 772 Station/Stop | | | | | | | | | | |
| North Side Facility: Station Access Road/ Station Entrance | n.a. | n.a. | B/14 | B/15 | B/15 | C/33 | B/15 | B/16 | B/15 | C/33 |
| South Side Facility: Station Access Road/ Station Entrance | n.a. | n.a. | A/9 | A/8 | A/9 | B/12 | A/9 | A/9 | A/9 | B/12 |

n.a. = not applicable
Underlined items meet threshold at which mitigation should be considered.

Route 789 is currently a two-lane local road that ends just north of the proposed BRT/Metrorail and Metrorail parking facility. It is assumed that this road would be widened to four lanes and extended to Waxpool Road (Route 625) by 2010.

#### BRT Alternative

In the vicinity of the Route 606 Stop, it is expected that traffic conditions will deteriorate as a result of project-related activity as well as area growth and development. In particular, delay at the Route 606/Route 789 intersection would substantially increase in the p.m. peak hour, warranting mitigation in the future.

Traffic operations at the Route 772 Stop entrance (whether on the north or south side of the Greenway) are expected to be at an acceptable level of service.

#### Metrorail Alternative

For the Route 606 Station, the proposed station entrances would operate at acceptable levels of service. However, traffic conditions at the Route 606/Route 789 intersection are projected to be worse for the Metrorail Alternative in both the a.m. and p.m. peak hours than for the Baseline Alternative. Moreover, in the a.m. peak hour, conditions at this intersection would be substantially worse for the Metrorail Alternative than for the BRT Alternative. Mitigation is warranted at this intersection for both the a.m. and p.m. peak periods.

As with the BRT Alternative, the Route 772 Station entrances would operate at acceptable levels of service.

#### BRT/Metrorail Alternative

Traffic operations for the BRT/Metrorail Alternative would be similar to the BRT Alternative. In both the a.m. and p.m. peak hours, delay at the existing Route 606/Route 789 intersection would be less than that for BRT. Like the BRT Alternative, however, delay in the p.m. peak period would still warrant mitigation at this intersection.

#### Phased Implementation Alternative

Traffic effects associated with the Phased Implementation Alternative would be identical to those of the Metrorail Alternative in 2025, as Metrorail would be the final phase of this alternative. Traffic conditions in the vicinity of the Route 606 Station/Stop are expected to worsen as each phase of the project is implemented. This deterioration is due largely to forecast growth in employment and population in the area.

### 6.2.5 TRAFFIC MITIGATION

Measures proposed to mitigate traffic impacts that would result from each of the Build Alternatives are summarized in Table 6.2-6. Where appropriate, reasons for not considering mitigation are also presented. The mitigation measures identified do not include specific design details, but are merely improvements that could be employed at each intersection to alleviate future traffic impacts resulting from the project. With mitigation, levels of service and delay at some intersections would be reduced to the levels forecast in the baseline condition.

Travel Demand Management (TDM) strategies could also be considered for effective mitigation. The compact, mixed-use development in most station areas would enhance accessibility by transit, walking, and biking. All of these characteristics facilitate employer-based TDM strategies and can contribute to reducing single occupancy vehicle (SOV) travel volumes. Examples of employer-based TDM strategies include:

- Financial/time incentives;
- Parking management;
- Preferential treatment for ride-sharers (carpools/vanpools); and
- Information and marketing.

A more detailed discussion of the recommended mitigation and its effects can be found in the *Traffic Analysis and Station Access Study* (June 2002).

## 6.3 EFFECTS ON TRANSIT SERVICE

The proposed Build Alternatives would add rapid transit service, either in the form of BRT, Metrorail, or BRT/Metrorail, to a corridor served by express and local bus services in the baseline condition. Implementation of any of the four Build Alternatives (and their alternative alignments) would result in a substantial increase in high-quality transit capacity within the Dulles Corridor.

The following sections summarize the effects that implementation of the Dulles Corridor Rapid Transit Project would have on the baseline transit system. Section 6.3.1 briefly describes the operations planning process for the Build Alternatives. Then Section 6.3.2 presents an analysis of the effects relative to several standard measures of transit service. Section 6.3.4 summarizes forecasted transit ridership for each Build Alternative and their alignment variations. Section 6.3.3 presents the anticipated impacts of the Build Alternatives on the operation of the existing Metrorail system. Finally, Section 6.3.5 presents the estimated operations and maintenance costs for each Build Alternative As before, analysis of the Phased Implementation Alternative addresses the opening year performance of each alternative.

Unlike the results of the traffic analysis, the results of the transit service analyses are shown for each BRT and Metrorail alignment, rather than for the alternatives as a whole, because there are more significant differences between individual alignments for the transit measures than for the highway measures. As before, Alignments T6, T9, and T9 Design Option were treated as one alignment for travel demand forecasting purposes. The results for the BRT/Metrorail Alternative are shown for the combination of BRT 1 and Alignment T4 because Alignment T4 would provide a "worst case impact" in terms of fleet requirements, operating statistics, and costs. Likewise, the results presented for the Phased Implementation Alternative assume Alignment T4.

Additional details on the performance of the alternatives relative to the various measures of transit service and on operating and maintenance costs are provided in the *Transit Operations and Maintenance Plan* (June 2002). Detailed information on the ridership forecasting process and results, including the full results of the analysis for the transit-related development scenario, is presented in the *Travel Demand Forecasting Methodology and Results Report* (June 2002).

### 6.3.1 TRANSIT OPERATIONS PLANNING

Operating plans for the Baseline Alternative and each Build Alternative were developed based on a common set of assumptions relating to fares, service frequencies, vehicle load factors, vehicle dwell times, corridor parking capacities, and other service variables. Each alternative was then modeled for its opening and design (2025) years based on a preliminary service plan. Following initial model runs, these preliminary service plans were adjusted to provide adequate capacity for ridership demand at maximum load points. The operating plans for each Build Alternative reflects both line-haul services operating within the corridor formed by the Dulles

**Table 6.2-6: Summary of Traffic Issues and Proposed Mitigation Measures***

| Station | Traffic Issue(s) | Proposed Mitigation | Build Alternatives | Required By | Responsible Agency |
|---|---|---|---|---|---|
| *Tysons Corner* | | | | | |
| Tysons East | • Insufficient capacity for NB left turns at Old Meadow Road/Route 123.<br>• Insufficient capacity for NB right turns at Colshire Drive/Route 123. | • Add second NB left turn lane.<br>• Convert NB left-through lane to a through-right lane. | • BRT/Metrorail, Metrorail, Phased Implementation<br>• BRT/Metrorail, Metrorail, Phased Implementation | • 2006<br>• 2006 | • VDOT<br>• DRPT/WMATA |
| Spring Hill Road/ Tysons-West*Park | • Insufficient capacity on all approaches at International Drive and Spring Hill Road/Jones Branch Drive. | • Modify current shared through-left turn to an exclusive left turn on the NB, SB, and EB approaches; change shared through-left turn combination on the WB approach to an exclusive through lane. | • BRT | • 2025 | • VDOT |
| *Mid-Corridor* | | | | | |
| Wiehle Avenue | • Insufficient capacity on the EB approach at Wiehle Avenue and Sunset Hills Road.<br>• Insufficient capacity on the WB approach at Wiehle Avenue and Sunrise Valley Drive. | • Add an EB right turn lane.<br>• Add WB right turn lane. | • All<br>• All | • 2010<br>• 2010 | • VDOT<br>• VDOT |
| Reston Parkway | • Insufficient capacity at the WB Dulles Toll Road Ramp and Reston Parkway intersection.<br>• Insufficient capacity at EB Dulles Toll Road ramp and Reston Parkway intersection.<br>• Insufficient capacity for EB movements at Sunset Hills Road/Reston Parkway.<br>• Insufficient capacity for the SB and NB movements at Sunrise Valley Drive/Reston Parkway.<br>• Insufficient capacity on the EB approach at Sunset Hills Drive/Town Center Parkway | • Add a NB left turn lane.<br>• Add NB through lane.<br>• Construct an additional EB right turn lane.<br>• Construct an additional NB through lane and an additional SB right turn lane.<br>• Construct an additional EB left turn lane. | • All<br>• All<br>• All<br>• All<br>• All | • 2025<br>• 2025<br>• 2010<br>• 2025<br>• 2010 | • VDOT<br>• VDOT<br>• VDOT<br>• VDOT<br>• VDOT |
| Herndon-Monroe | • Insufficient capacity on the NB and SB approaches to the WB Dulles Toll Road ramp/Fairfax County Parkway.<br>• Insufficient capacity for the NB, SB, | • Construct an additional through lane on the NB and SB approaches.<br>• Modify lane configurations on NB, SB, and WB | • All<br>• All | • 2025<br>• 2025 | • VDOT<br>• VDOT |

| Station | Traffic Issue(s) | Proposed Mitigation | Build Alternatives | Required By | Responsible Agency |
|---|---|---|---|---|---|
| | and WB approaches to Monroe Street/Van Buren Street.<br>• Insufficient capacity for SB movements at Fox Mill Road/Sunrise Valley Drive and Monroe Street.<br>• Insufficient capacity on the EB and WB approaches at Sunrise Valley Drive/Roark Drive. | approaches so that through-right combination is now an exclusive right turn lane.<br>• Construct a SB left turn lane.<br>• Construct an additional EB and WB through lane. | • All<br>• All | • 2010<br>• 2010 | • VDOT<br>• DRPT/WMATA |
| Route 28 | • Insufficient capacity for NB movements at Centreville Road/Worldgate Drive.<br>• Insufficient capacity for WB movements at the Dulles Airport Toll Road WB Ramp/Centreville Road.<br>• Insufficient capacity for EB movements at the Dulles Airport Toll Road EB Ramp/Centreville Road.<br>• Insufficient capacity on all approaches at Herndon Parkway/Centreville Road. | • Construct an additional NB through lane.<br>• Construct an additional WB right turn lane.<br>• Construct an exclusive EB right turn lane.<br>• Construct exclusive right turn lanes on all approaches; construct an additional exclusive left turn lane on the NB and EB approaches. | • All<br>• All<br>• All<br>• All | • 2025<br>• 2025<br>• 2025<br>• 2025 | • VDOT<br>• VDOT<br>• VDOT<br>• VDOT |
| *Loudoun County* | | | | | |
| Route 606 | • Insufficient capacity at the station entrance and Route 789. | • Modify lane configuration to include an exclusive left turn lane and a through-left combination out of the station; construct two SB right turn lanes on Route 789. | • All | • 2010 | • DRPT/WMATA |

Proposed mitigation is subject to VDOT approval.

Connector Road and the DAAR and Dulles Toll Road (and Tysons Corner for each of the Metrorail alignments) and complementary local and feeder bus service. Specific route changes and adjustments to service frequencies under each Build Alternative, as well as more detail on the operations planning process, is presented in the *Transit Operations and Maintenance Plan* (June 2002).

## 6.3.2 MEASURES OF TRANSIT SERVICE

Several measures were evaluated to assess both the level of service that would be provided under each of the Build Alternatives, and the change in the level of passenger convenience associated with each alternative. Specific measures considered include:

**Amount of Service**

- Annual Revenue Vehicle Hours of Service
- Transit Capacity
- Peak Vehicle Requirements

**Passenger Convenience**

- Transit Travel Times
- Hours of Operation
- Frequency of Service
- Transfer Requirements

### 6.3.2.1 Annual Revenue Vehicle Hours of Service

Annual revenue vehicle hours are a fundamental measure of the amount of transit service provided within a corridor and provide a detailed understanding of the level of service that will be available to transit riders. The variables that dictate the number of annual revenue vehicle hours under each Build Alternative or during phased implementation include the number of vehicles (local bus, express bus, BRT, and Metrorail vehicles) in service under each alternative and the portion of the day each vehicle spends actually carrying passengers. Factors that will increase revenue vehicle hours include putting additional vehicles into service or extending the amount of time vehicles serve passengers.

Table 6.3-1 provides annual revenue vehicle hours for each alternative and alignment option, by service type or provider.

**Table 6.3-1: Revenue Vehicle Hours by Alternative – 2025**

| Transit Service | Baseline | BRT | | | Metrorail | | | BRT/ Metrorail | Phased Implementation |
|---|---|---|---|---|---|---|---|---|---|
| | | BRT 1 | BRT 2 | BRT 3 | T1 | T6/T9 | T4 | BRT 1/T4 | T4 |
| Metrorail | 623,480 | 623,480 | 623,480 | 6,23,480 | 711,740 | 713,380 | 714,240 | 673,230 | 714,240 |
| Bus Rapid Transit | n.a. | 248,590 | 259,830 | 327,340 | n.a. | n.a. | n.a. | 194,280 | n.a. |
| WMATA Bus | 127,125 | 115,625 | 115,625 | 115,625 | 109,325 | 109,325 | 109,325 | 109,325 | 109,325 |
| Fairfax Connector | 250,500 | 231,200 | 231,200 | 231,200 | 198,700 | 198,700 | 198,700 | 198,100 | 198,700 |
| Loudoun County | 46,700 | 46,100 | 46,100 | 46,100 | 46,100 | 46,100 | 46,100 | 46,100 | 46,100 |
| **TOTAL** | **1,001,505** | **1,218,895** | **1,230,135** | **1,297,645** | **1,019,765** | **1,021,405** | **1,022,265** | **1,174,935** | **1,021,405** |

Total revenue vehicle hours of service are higher for each of the Build Alternatives than for the 2025 Baseline Alternative, because of the increased service level is provided by the project. A more detailed assessment of each Build Alternative is provided below.

#### BRT Alternative

Each of the BRT alignments would have higher total revenue vehicle hours than both the Metrorail and BRT/Metrorail alternatives. This result is based on two factors. First, Metrorail trains provide significantly more capacity than a comparable "unit" of BRT (see Section 6.3.2.2); therefore, fewer revenue hours of rail are needed to deliver the same level of service provided under BRT. Second, fewer revenue hours of Fairfax Connector and Metrobus service are required to provide feeder and circulator services for the Metrorail Alternative, because a number of circulator routes and a direct West Falls Church link to Tysons Corner are eliminated.

BRT 3 would generate the highest level of revenue hours of service among the Build Alternatives because it requires an operating plan in which each station/stop is served by a distinct route pattern, rather than a plan in which one pattern serves multiple stations. Accordingly, there are far more route patterns for BRT 3 than for the other BRT alignments, resulting in more vehicles and vehicle hours.

#### Metrorail Alternative

The total revenue vehicle hours for each Metrorail alignment are greater than those for the Baseline Alternative, but less than the estimated BRT and BRT/Metrorail revenue hours, because a Metrorail train has higher capacity than a BRT vehicle and because local bus routes would be reconfigured for the Metrorail Alternative.

#### BRT/Metrorail Alternative

The revenue vehicle hours associated with the BRT/Metrorail Alternative are less than those for the BRT Alternative and greater than the revenue hours for the Metrorail Alternative. West of Tysons Corner, the BRT/Metrorail Alternative would require more BRT vehicles to provide the same level of service in the corridor provided by the Metrorail Alternative.

#### Phased Implementation Alternative

Annual vehicle revenue hours for the Phased Implementation Alternative would be identical to those of the Metrorail Alternative in 2025, as Metrorail would be the final phase of this alternative. For each phase of the project, the number of revenue vehicle hours of service would decline as Metrorail trains replace BRT vehicles operating in the corridor.

### 6.3.2.2 Transit Capacity

Transit capacity in the corridor represents the amount of physical space available to carry passengers and provides an understanding of the number of riders that can be comfortably accommodated in the corridor during peak travel times. This measure also provides an understanding of the level of service provided under each of the alternatives and how well transit supports the corridor's mobility needs.

Total capacity will vary according to the number of vehicles in service and the capacity of each of those vehicles. Vehicle capacity, in turn, will vary based on vehicle size, policies regarding the level of acceptable vehicle loading, and the allowable number of standing passengers.

Table 6.3-2 summarizes the transit capacity provided at each of the corridor stations/stops (or station areas in the Baseline Alternative) for the peak direction, peak hour of morning service in the horizon year. The figures in the table represent the number of peak-hour spaces available to carry passengers at each station or station area under each alternative.

**Table 6.3-2: Transit Capacity by Alternative – 2025 (a.m. peak hour)**

| Station/Stop | Baseline | BRT | | | Metrorail | | | BRT/ Metrorail | Phased Implementation |
|---|---|---|---|---|---|---|---|---|---|
| | | BRT 1 | BRT 2 | BRT 3 | T1 | T6/9 | T4 | BRT 1/T4 | T4 |
| West Falls Church | 1,485 | 5,330 | 5,330 | 5,330 | 9,690 | 9,690 | 9,690 | 9,690 | 9,690 |
| Spring Hill Road/ Tysons-West*Park | 607 | 2,530 | 883 | 1,188 | n.a. | n.a. | n.a. | n.a. | n.a. |
| Tysons East | 90 | n.a. | n.a. | n.a. | 9,600 | 9,600 | 9,600 | 9,600 | 9,600 |
| Tysons Central A | – | n.a. | n.a. | n.a. | n.a. | n.a. | 9,600 | 9,600 | 9,600 |
| Tysons Central B | – | n.a. | n.a. | n.a. | n.a. | n.a. | 9,600 | 9,600 | 9,600 |
| Tysons Central C | – | n.a. | n.a. | n.a. | n.a. | 9,600 | 9,600 | 9,600 | 9,600 |
| Tysons Central (Central D) | 400 | n.a. | n.a. | n.a. | 9,600 | 9,600 | 9,600 | 9,600 | 9,600 |
| Tysons West | – | n.a. | n.a. | n.a. | 9,600 | 9,600 | 9,600 | 9,600 | 9,600 |
| Wiehle Avenue | 720 | 2,370 | 2,858 | 1,333 | 9,780 | 9,780 | 9,780 | 2,370 | 9,780 |
| Reston Parkway | – | 1,830 | 2,318 | 793 | 9,600 | 9,600 | 9,600 | 1,830 | 9,600 |
| Herndon-Monroe | 1,012 | 2,225 | 3,018 | 2,408 | 9,600 | 9,600 | 9,600 | 1,920 | 9,600 |
| Route 28 | – | 1,830 | – | – | 9,600 | 9,600 | 9,600 | 1,830 | 9,600 |
| Dulles Airport | – | 305 | 793 | 1,098 | 9,600 | 9,600 | 9,600 | 610 | 9,600 |
| Route 606 | 495 | 1,840 | 1,413 | 2,023 | 9,915 | 9,915 | 9,915 | 1,535 | 9,915 |
| Route 772 | – | 1,525 | 1,098 | 1,708 | 9,600 | 9,600 | 9,600 | 1,220 | 9,600 |

Vehicle Capacity Assumptions: Metrorail – 120 passengers per vehicle; Fairfax Connector and Loudoun County – 45 passengers per vehicle (assumes some standees); BRT vehicles – 61 passengers per vehicle.

An analysis of the capacity for each Build Alternative is provided below.

### BRT Alternative

The BRT Alternative would provide a far higher level of capacity than the Baseline, especially in the western end of the corridor, where minimal transit service exists today. Capacity would vary for the different BRT alignments. For instance, capacity is higher at the western stops for BRT 3 because of the heavier bus volumes at these stations relative to the other alignments. For BRT 2, more service originates at Mid-Corridor stations such as Herndon-Monroe and Reston Parkway, resulting in higher capacities at those stations for this alignment.

### Metrorail Alternative

The Metrorail Alternative provides a substantially higher level of capacity at all stations in the corridor relative to BRT, because of the much higher capacity provided by one rail train versus one BRT vehicle.

### BRT/Metrorail Alternative

The capacities provided by the BRT/Metrorail Alternative would be similar to the capacities provided by its BRT and Metrorail counterparts. In some instances, capacities at stations served by BRT are different for the BRT/Metrorail Alternative than for the BRT Alternative, because adjustments were made to service patterns to reflect demand at individual stations.

### Phased Implementation Alternative

The Phased Implementation Alternative would provide capacity levels identical to those of the Metrorail Alternative in 2025, as Metrorail would be the final phase of this alternative. In terms of project phasing, transit capacity in the corridor would increase in the opening year of each alternative, as Metrorail trains replace BRT vehicles in the corridor.

### 6.3.2.3 Peak Vehicle Requirements

Peak vehicle requirements represent the number of vehicles that would be required to meet the peak levels of demand in the corridor under each of the Build Alternatives. This measure is another means of describing the level of transit service provided in the corridor, and also helps identify the level of resources that would be required to provide service during the busiest periods of the day (including drivers and associated vehicle maintenance personnel). Table 6.3-3 presents the peak vehicle requirements for each alternative in 2025. Peak vehicle requirements under the Baseline and the four Build Alternatives would vary depending on mode and operator. These patterns are described in greater detail below.

**Table 6.3-3: Peak Vehicle Requirements – 2025**

| Transit Service | Baseline | BRT | | | Metrorail | | | BRT/ Metrorail | Phased Implementation |
|---|---|---|---|---|---|---|---|---|---|
| | | BRT 1 | BRT 2 | BRT 3 | T1 | T4 | T6/T9 | BRT 1/T4 | T4 |
| Metrorail | 1,084 | 1,098 | 1,098 | 1,098 | 1,210 | 1,218 | 1,218 | 1,138 | 1,218 |
| Bus Rapid Transit | n.a. | 87 | 96 | 98 | n.a. | n.a. | n.a. | 65 | n.a. |
| WMATA Bus | 32 | 29 | 29 | 29 | 25 | 25 | 25 | 25 | 25 |
| Fairfax Connector | 91 | 76 | 76 | 76 | 68 | 68 | 68 | 64 | 68 |
| Loudoun County | 25 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 |
| TOTAL | **1,232** | **1,312** | **1,321** | **1,323** | **1,325** | **1,333** | **1,333** | **1,314** | **1,333** |

### BRT Alternative

For the BRT Alternative, peak vehicle requirements would decrease for the corridor's three bus operators. Fairfax Connector peak vehicle requirements would decline as their corridor service is replaced with BRT, and Loudoun County would also experience a small decrease in peak vehicle requirements. WMATA Metrobus requirements would fall as some service within Tysons Corner is scaled back to feed (and provide complementary circulation to) BRT service. Vehicle requirements for the existing Metrorail system would increase under the BRT Alternative because the new BRT service would feed more trips into the Metrorail system at West Falls Church than those projected under the Baseline Alternative. This increase would require an additional 14 Metrorail cars to meet demand in the peak period.

BRT vehicle requirements would vary for each BRT alignment. Because BRT 1 would include four stations in the median of the DAAR, this alignment option would be able to serve more stations with fewer vehicles. BRT 2 and BRT 3 would have fewer median stations, requiring more routes and more BRT vehicles to adequately serve corridor travel markets.

### Metrorail Alternative

Relative to the Baseline and BRT alternatives, Fairfax Connector and Metrobus would all have reduced peak vehicle requirements under the Metrorail Alternative. For Fairfax Connector, this decline results from additional replacement of corridor line-haul service with Metrorail. For Metrobus, the decline is the result of cutting back circulators within Tysons Corner. Loudoun County service remains consistent across Build

Alternatives. An additional 126 to 134 rail cars, depending on the alignment, would be needed to meet peak period Metrorail service requirements under this alternative.

### BRT/Metrorail Alternative

The peak vehicle requirements for the local and express operators would be less than the requirements for both the Baseline and BRT alternatives, primarily because local bus service within Tysons Corner is reduced and replaced by Metrorail service. BRT vehicle requirements would not be as high for the BRT/Metrorail Alternative as for the BRT Alternative because BRT vehicles will run shorter distances and thus fewer vehicles are required to provide service.

### Phased Implementation Alternative

Peak vehicle requirements for the Phased Implementation Alternative would be identical to the vehicles required for the Metrorail Alternative in 2025, as Metrorail would be the final phase in this alternative. It should be noted that transit improvements assumed in the 2025 Baseline Alternative result in significant increases in local bus service between 2000 and 2025. Implementation of the BRT phase marginally reduces 2005 baseline service levels, which would still result in an increase in peak vehicle requirements over 2000 levels. As phased implementation continues, Metrorail vehicle requirements would increase, as BRT requirements decrease. The BRT vehicle fleet would be eliminated in the corridor by 2010.

## 6.3.2.4 Transit Travel Times

The level of convenience for passengers using transit is directly related to the amount of time that is required to make a trip by bus or rail versus alternative modes such as the automobile. Transit travel time includes time spent accessing the station or stop, time spent waiting for the bus or train, time spent riding the bus or train, and the time spent transferring between transit services. The longer each of these transit trip components take, the less attractive transit becomes relative to other modes for travelers who have a choice of mode. For passengers who do not have access to other modes and thus rely on transit to meet their basic mobility needs, excessive travel times result in less time available to spend on other priorities. Table 6.3-4 shows 2025 transit travel times for the Baseline and the four Build Alternatives for select origin/destination (O/D) pairs within the region.

**Table 6.3-4: Transit Travel Times for Select O/D Pairs – 2025 (minutes)**

| Origin/Destination | | Baseline | | BRT | | | Metrorail | | | BRT/ Metrorail | Phased Implementation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Highway | Transit | BRT 1 | BRT 2 | BRT 3 | T1 | T6 | T4 | BRT 1/T4 | T4 |
| Tysons Corner (north) | Metro Center | 35 | 37 | 34 | 37 | 34 | 36 | 38 | 38 | 38 | 38 |
| Reston Town Center | Union Station | 59 | 57 | 51 | 49 | 52 | 50 | 51 | 51 | 57 | 51 |
| Union Station | Reston Town Center | 46 | 78 | 58 | 63 | 60 | 55 | 56 | 57 | 64 | 57 |
| Rosslyn | Dulles Airport | 36 | 64 | 45 | 50 | 47 | 42 | 43 | 44 | 51 | 44 |
| Herndon-Monroe | Pentagon | 57 | 50 | 52 | 51 | 54 | 54 | 55 | 55 | 60 | 55 |
| Herndon-Monroe | Tysons Corner Center | 26 | 42 | 33 | 39 | 41 | 25 | 26 | 26 | 30 | 26 |

| Origin/Destination | | Baseline | | BRT | | | Metrorail | | | BRT/ Metrorail | Phased Implementation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Highway | Transit | BRT 1 | BRT 2 | BRT 3 | T1 | T6 | T4 | BRT 1/T4 | T4 |
| Tysons Corner (west) | Dulles Airport | 21 | 72 | 33 | 48 | 45 | 19 | 19 | 19 | 21 | 19 |
| Reston Town Center | Tysons Corner (east) | 25 | 46 | 31 | 30 | 33 | 18 | 19 | 19 | 25 | 19 |
| Reston Town Center | Dulles Airport | 12 | 44 | 11 | 13 | 12 | 8 | 8 | 8 | 8 | 8 |

### BRT Alternative

The BRT Alternative would result in travel timesavings relative to the Baseline Alternative for all but one of the O/D pairs. For the Herndon-Monroe/Pentagon pair, there would be a small increase in travel time over the Baseline Alternative, because there is currently a direct point-to-point service from the Herndon/Reston area to the Pentagon. Implementation of the BRT Alternative will require a transfer from BRT to Metrorail and thus result in a small travel time increase. For the Tysons Corner/Metro Center and Herndon-Monroe/Tysons Corner Center pairs, the projected travel time decreases are relatively small. These pairs also have current direct point-to-point service and thus BRT does not substantially improve quality of service. In most cases, however, transit travel timesaving would be substantial under the BRT Alternative.

### Metrorail Alternative

Travel timesaving associated with the Metrorail Alternative would have a similar pattern of improvements over the Baseline Alternative to those described for the BRT Alternative, although for the majority of the O/D pairs the travel timesaving are even more substantial for Metrorail. Metrorail would offer greater timesaving because it operates with one service pattern that provides the same high-frequency service to all stations in the corridor. BRT, on the other hand, operates with multiple service patterns and varying service frequencies at each station. For example, service for the Tysons Corner/Dulles Airport pair under BRT (especially BRT 2 and BRT 3) is relatively infrequent, whereas Metrorail service runs every six minutes. Overall, the result is that the Metrorail Alternative would provide a very substantial increase in the level of service for the full range of corridor O/D pairs. This high level of service, in turn, would result in a parallel improvement in corridor travel times.

### BRT/Metrorail Alternative

Travel timesavings associated with this alternative follow the same patterns as the other two Build Alternatives, though there are some O/D pairs for which travel timesavings are less than those for the BRT and Metrorail alternatives. In these instances, the small differences in travel times are typically associated with the location of the BRT/Metrorail transfer station. The shift from the West Falls Church Metrorail Station to the Tysons West Station would require transit passengers traveling through Tysons Corner to other destinations to ride Metrorail through several stops in Tysons, whereas in the BRT Alternative they would have non- or one-stop service.

### Phased Implementation Alternative

The Phased Implementation Alternative would result in travel times identical to those for the Metrorail Alternative in 2025, as Metrorail would be the final phase in this alternative. Implementation of each phase of the project would substantially improve transit travel times in the Dulles Corridor. The pattern of travel timesaving associated with BRT in its opening year (2005) would be generally similar to the pattern for the 2025 BRT Alternative, with timesaving for most O/D pairs relative to the Baseline Alternative.

Implementation of Metrorail for the full length of the corridor in 2010 would provide even higher transit travel timesavings for the full range of O/D pairs.

### 6.3.2.5 Hours of Operation and Frequency of Service

Hours of operation are an important determinant of the quality of transit service that will be provided in the Dulles Corridor, including how well transit service will support everyday activities and transit needs other than peak-hour commutes. Service hours of operation, or span of service, for the Baseline Alternative would not change substantially after implementation of any of the Build Alternatives. Overall span of service for local/feeder bus would correspond to Metrorail's operating hours: 5:30 a.m. to 12 p.m. on weekdays (2 a.m. on Friday), 8 a.m. to 2 a.m. on Saturdays, and 8 a.m. to midnight on Sundays. Limited "night owl" bus service operates beyond these hours throughout the region.

While the overall span of service is comparable between the Baseline and the four Build Alternatives, service frequencies, particularly in the off-peak periods (midday and evening), are much better for each of the Build Alternatives than for the Baseline Alternative. For the Baseline, the high-quality express services operated by Fairfax and Loudoun counties are run only in the peak periods (and predominantly in the peak direction), and therefore, the level of service in the midday and evening periods decreases significantly. Improved service frequencies for each of the Build Alternatives during the midday and evening periods would address this fall-off in Baseline services. Table 6.3-5 summarizes the range of service frequencies planned under each of the alternatives for both the peak and off-peak periods. Specific analysis of each Build Alternative is outlined below.

**Table 6.3-5: Peak and Off-Peak Headways (minutes)**

| | | Baseline | BRT | Metrorail | BRT/Metrorail | Phased Implementation |
|---|---|---|---|---|---|---|
| Peak Period | Fairfax County Commuter Service | 5-30 | 15-60 | 60 | 15-60 | 60 |
| | Loudoun County Commuter Service | 15 | 30 | 30 | 30 | 30 |
| | BRT | | 6-12 | | 4-12 | |
| | Metrorail | | 6 | 6 | 6 | 6 |
| Off-Peak Period | Fairfax County Commuter Service | 30-60 | 60 | 60 | 60 | 60 |
| | Loudoun County Commuter Service | 60 | No service | No service | No service | No service |
| | BRT | | 12-24 | | 12 | |
| | Metrorail | | 12 | 12 | 12 | 12 |

#### BRT Alternative

The range of BRT headways shown in Table 6.3-5 reflect the different service patterns that have been designed to meet varying passenger loads at different BRT stations. The Metrorail policy headway of six minutes peak/12 minutes off-peak was originally assumed for each of the BRT design options; however, forecast peak-period demand for some routes could not be met by six-minute frequencies, so headways were reduced to four minutes on some peak-period service patterns in the BRT 2 and BRT 3 options. However, the headways for the core BRT routes would be six to 12 minutes, as shown in Table 6.3-5. Conversely, low demand forecast for several other routes justified an increase in headways of up to 24 minutes in the off-peak period.

In general, headways for the Baseline Alternative in both peak and off-peak periods are not competitive with the service frequencies delivered by the BRT Alternative. An exception to this is the five-minute peak-period express service assumed for Fairfax Connector's Route 980 between Herndon-Monroe and the West Falls Church Metrorail Station. However, Route 980 offers a point-to-point service for a single O/D pair within the corridor and does not provide the corridor-wide mobility improvements associated with the BRT Alternative. Furthermore, the majority of peak-period express and line-haul service provided by Fairfax County is operated at 15- and 30-minute frequencies. The difference in service frequencies between the Baseline and BRT Alternative in the off-peak period is even more pronounced. Midday frequencies do not exceed 30 minutes in the Baseline condition, but operate at 12-minute intervals under BRT.

#### Metrorail Alternative

Metrorail service frequencies are comparable to the BRT Alternative, but do not deviate from a six-minute peak/12-minute off-peak service.

#### BRT/Metrorail

The span of service and frequency characteristics for the BRT/Metrorail Alternative are the same as those for the other 2025 Build Alternatives.

#### Phased Implementation Alternative

Service frequencies for the Phased Implementation Alternative would be identical to those assumed for the Metrorail Alternative in 2025, as Metrorail would be the final phase in this alternative. In terms of project phasing, service frequencies improve immediately upon implementation of the BRT Alternative in 2005, and do not change significantly during the subsequent BRT/Metrorail and Metrorail phases of the project.

### 6.3.2.6 Transfer Requirements

The number of transfers required to make a trip from an origin to a destination is one of the most important determinants of passenger convenience and comfort. Research shows that there are several reasons transfers decrease the attractiveness of a transit service. First, the added time associated with transfers increases a passenger's overall trip time. Second, transfers between different transit lines often take place at bus stops that are unprotected from the elements and not suited to long waits. Third, there is a discomfort associated with uncertainty about the arrival of the vehicle being transferred to, specifically whether the vehicle will be early (and therefore missed by on-time arriving passengers), late, or will arrive at all. For the Baseline and the four Build Alternatives, the project team determined the minimum number of transfers necessary to travel between select O/D pairs (the same pairs analyzed for travel time effects). The results of this analysis are summarized below.

#### BRT Alternative

For all but one of the O/D pairs, the BRT Alternative would require the same number of transfers as the Baseline Alternative, or would require more transfers. Generally, this is because BRT would still require a transfer for trips going to destinations outside the corridor, typically to Metrorail at West Falls Church Station. For the Herndon-Monroe/Pentagon and Herndon-Monroe/Tysons Corner Center pairs transfer requirements increase under the BRT Alternative. For the first pair, an express service currently exists between the Reston area and the Pentagon. A person originating at Herndon-Monroe would have to make one transfer, from a local bus to the express service at Wiehle Avenue. Under the BRT Alternative, this trip to the Pentagon would require transfers at West Falls Church Station between BRT and Metrorail and at Rosslyn Station between the Orange and Blue Lines. For the second O/D pair, the Baseline Alternative provides direct, point-to-point service between Herndon-Monroe and the Tysons Corner Center shopping mall, but BRT requires a transfer

to a local circulator at Spring Hill Road/Tysons-West*Park Transit Station to get to the heart of Tysons Corner.

One O/D pair (Reston Town Center/Dulles Airport) would have fewer transfer requirements for the BRT Alternative than for the Baseline Alternative. In this instance, the trip is within the Dulles Corridor and therefore no transfer would be required at West Falls Church Station.

All transfers between BRT and Metrorail at West Falls Church Station would be "intra-system" transfers. These transfers would be completed within the system and would be similar to a transfer between two Metrorail lines. This seamless transfer within a paid area protected from the elements makes much of the burden typically associated with a transfer between two bus lines less onerous, but still requires moving between platforms and does not provide the convenience of a one-seat ride.

#### Metrorail Alternative

For all but two of the O/D pairs analyzed, transfer requirements would decrease under the Metrorail Alternative relative to the Baseline Alternative, because Metrorail would not require a transfer at the Orange Line. Furthermore, Metrorail would provide direct access to the center of Tysons Corner. For the Herndon-Monroe/Pentagon and Herndon-Monroe/Tysons Corner pairs, transfer requirements would be the same for the Metrorail and Baseline alternatives. For the first pair, the Baseline trip would require one transfer between local bus and express bus, and Metrorail would require one transfer from the Dulles Corridor Line to the Blue Line at Rosslyn. For the second pair, Metrorail would provide the same point-to-point service currently provided by Fairfax Connector.

#### BRT/Metrorail Alternative

The BRT/Metrorail Alternative has similar transfer characteristics to both the BRT and Metrorail alternatives. The key factor dictating whether transfer requirements would decline, remain the same, or increase is whether the trip between the O/D pair can be made on one mode (BRT or Metrorail) or whether an intra-system transfer is required. For BRT/Metrorail, passengers would not be required to transfer to a local bus to access the core of Tysons Corner because the Metrorail portion of the alternative provides direct service into Tysons Corner.

#### Phased Implementation

Transfer requirements under the Phased Implementation Alternative would be identical to those under the Metrorail Alternative in 2025, as Metrorail would be the final phase of this alternative. In addition, the opening year transfer requirements for each Build Alternative would be identical to the transfer requirements described for the alternatives in 2025. For many O/D pairs, the transfer requirements would initially increase with the implementation of BRT. As subsequent phases are implemented, transfer requirements for most O/D pairs would decrease. Once Metrorail is implemented, the majority of trips for the analyzed O/D pairs would require fewer transfers than the Baseline Alternative.

### 6.3.3 EFFECTS TO REGIONAL RAIL OPERATIONS

The implementation of each of the Build Alternatives would affect the operations of other portions of the regional transit system, including Metrorail, Metrobus, and the local operating systems in the corridor. Sections 6.3.2.2 and 6.3.2.5 address project effects to WMATA Metrobus, Fairfax County, and Loudoun County vehicle and service requirements. In addition, Section 6.3.5 presents the effects of each Build Alternative on regional and local transit system operating costs.

This section discusses the effects of each Build Alternative on assumed baseline Metrorail system capacity and operations. Specific issues include:

- The ability of Metrorail vehicles to accommodate additional passenger loads resulting from the implementation of the Dulles Corridor Rapid Transit Project without significant crowding, particularly in the peak hour of demand;
- The ability to accommodate the frequency of trains required to meet travel demand between the Dulles Corridor and the core Metrorail system (generally defined as downtown Washington D.C. and eastern Arlington County). The key issue is train capacity in the Rosslyn portal between Arlington and Washington D.C. and the shared Blue/Orange Line through downtown Washington D.C.

The following summarizes the forecast effects of the Dulles Corridor Rapid Transit Project on these and other Metrorail operational issues.

#### 6.3.3.1 Passenger Volumes at Maximum Load Points

Table 6.3-6 summarizes forecast 2025 Metrorail passenger loads at the maximum load point during the peak hour of the a.m. peak period for each Alternative and alignment. The maximum passenger load point (that is, the point where Metrorail vehicles experience the highest passenger volumes and thus the most crowding) for all alternatives occurs between the Courthouse and Rosslyn stations. The average load per car reflects the number of passengers carried on each car (on each train) during the peak hour, assuming that passenger loads are spread evenly among all cars (on all trains) in operation during that period.

WMATA's current primary passenger load guideline is 140 passengers per rail car (ppc) in the peak direction during the peak 30-minute period (e.g., the peak of the peak). This guideline translates into 132 ppc in the peak hour to reflect the fact that boarding patterns are not as concentrated over the full peak hour as they are in the peak 30 minutes. In an effort to improve the quality of Metrorail service, WMATA has established an objective of reducing its passenger load standard to 120 ppc in the peak hour. This passenger load guideline was used in WMATA's Core Capacity Study (see Section 1.6.3.1) and in determining Metrorail fleet requirements for the Dulles Corridor Rapid Transit Project (as presented in Section 6.3.2.3).

Section 6.1.2.1 describes current Metrorail Orange Line operations, and those assumed in the Baseline Alternative for the Dulles Corridor Rapid Transit Project. Orange Line services include mainline service originating at the Vienna Metrorail station (Vienna service), as well as a supplemental peak period service originating at the West Falls Church station. The Metrorail, BRT/Metrorail, and Phased Implementation Alternatives replace this supplemental peak period Orange Line service with a new Metrorail line originating in the Dulles Corridor and operating along the Orange Line alignment beginning at the East Falls Church Metrorail station. The BRT Alternative retains the supplemental peak period service provided in the Baseline. Table 6.3-6 presents maximum passenger loads on all of these services under each Alternative and alignment, as well as total “equilibrated” loads, which reflect the average load carried between the services. To achieve WMATA’s passenger load guideline as much as possible, travel demand forecasts for all Alternatives require eight car trains for both Orange Line services, except for the supplemental peak period service in the Baseline Alternative; as noted in Section 6.1.2.1, this service requires a mix of eight and six car trains. The average loads per car presented in Table 6.3-6 reflect these rail car requirements.

#### BRT Alternative

The data in Table 6.3-6 show that forecast Metrorail ridership resulting from implementation of the BRT Alternative would increase passenger volumes on both Orange Line services, as compared to the Baseline

Alternative. In the case of Orange Line Vienna service, passenger loads exceed WMATA's current and future load standards, as additional passengers transferring from BRT to Metrorail at the West Falls Church station will exacerbate already crowded conditions. Loads are forecast to essentially remain the same on the supplemental service after implementation of the BRT Alternative, because the increased ridership demand carried on this service would trigger the need to operate eight car trains throughout the peak period. This service would easily meet WMATA's 120-ppc load objective.

**Table 6.3-6: A.M. Peak Hour Maximum Loads and Average Loads Per Vehicle - 2025**

| Alternative | Peak Hour Passenger Load | Average Load Per Car |
|---|---|---|
| Baseline | | |
| Orange Line Supplemental Peak Period Service | 6,728 | 96 |
| Orange Line Vienna Service | 11,183 | 140 |
| Total | 17,911 | 119 |
| BRT 1 | | |
| Orange Line Supplemental Peak Period Service | 7,732 | 97 |
| Orange Line Vienna Service | 11,764 | 147 |
| Total | 19,496 | 122 |
| BRT 2 | | |
| Orange Line Supplemental Peak Period Service | 7,864 | 98 |
| Orange Line Vienna Service | 11,887 | 149 |
| Total | 19,751 | 123 |
| BRT 3 | | |
| Orange Line Supplemental Peak Period Service | 7,896 | 99 |
| Orange Line Vienna Service | 11,930 | 149 |
| Total | 19,826 | 124 |
| Metrorail T1 | | |
| Dulles Line Service | 10,853 | 136 |
| Orange Line Vienna Service | 9,713 | 121 |
| Total | 20,566 | 129 |
| Metrorail T4 | | |
| Dulles Line Service | 10,700 | 134 |
| Orange Line Vienna Service | 9,749 | 122 |
| Total | 20,449 | 128 |
| Metrorail T6/T9 | | |
| Dulles Line Service | 10,711 | 134 |
| Orange Line Vienna Service | 9,717 | 121 |
| Total | 20,428 | 128 |
| BRT/Metrorail (BRT 1/T4) | | |
| Dulles Line Service (through Tysons Corner) | 9,204 | 115 |
| Orange Line Vienna Service | 9,900 | 124 |
| Total | 19,104 | 119 |
| Phased Implementation (assuming T4 Metrorail alignment) | | |
| Dulles Line Service | 10,711 | 134 |
| Orange Line Vienna Service | 9,717 | 122 |
| Total | 20,428 | 128 |

### Metrorail Alternative

The data in Table 6.3-6 show that implementation of any of the Metrorail Alternative alignments would lower passenger loads on the Vienna service, as compared to the baseline. Loads on this Orange Line service would decrease because the Metrorail Alternative attracts passengers living within the Dulles Corridor who would have boarded the system at an existing Orange Line station (Vienna, Dunn Loring, or West Falls Church) in the baseline condition. Orange Line loads under the Metrorail Alternative would be only slightly over the 120 ppc per hour load standard objective.

Passenger loads on the Dulles line are forecast to increase significantly over volumes carried on the Baseline supplemental service that the Metrorail Alternative replaces. This increase results in passenger loads, which exceed both standards, although they fall only slightly above the existing primary standard (in effect, only two more customers are standing per car in the peak hour at the maximum load point).

### BRT/Metrorail Alternative

Implementation of the BRT/Metrorail Alternative is forecast to result in similar, though slightly more modest, effects to the Orange Line, as would the Metrorail Alternative. The loads of both the Dulles Line through Tysons Corner and the Orange Line loads would meet WMATA's 120 ppc per hour objective.

### Phased Implementation Alternative

The Phased Implementation Alternative would result in effects to the Orange Line that would be identical to the Metrorail Alternative in 2025. Over the course of the implementation of this alternative, increasing passenger volumes would trigger the need for operating longer trains.

## 6.3.3.2 Rosslyn Portal Throughput

Table 6.3-7 presents the number of peak hour trains assumed to run through the Rosslyn Portal and on the shared Blue/Orange Line in downtown Washington, D.C., under the Baseline and Build alternatives.

**Table 6.3-7: Peak Period Train Throughput – Rosslyn Tunnel and Shared Blue/Orange Line (peak direction) Horizon Year 2025**

| Service | Baseline | | | BRT | BRT/ Metrorail | Metrorail and Phased Implementation | | |
|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | BRT 1/T4 | T1 | T4 | T6/9 |
| | Trains/Hr | Trains/Hr | Trains/Hr | Trains/Hr | Trains/Hr | Trains/Hr | Trains/Hr | Trains/Hr |
| Blue Line | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Orange Line (Vienna) | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Orange Line (Tripper) | 10 | 10 | 10 | 10 | n.a. | n.a. | n.a. | n.a. |
| Dulles Line | n.a. | n.a. | n.a. | n.a. | 10 | 10 | 10 | 10 |
| Total | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |

Source: Transit Operations and Maintenance Plan (June 2002)

As the table shows, the total number of trains operating through the tunnel between the Rosslyn and Foggy Bottom stations and on the shared line through Washington, D.C. during the peak period would be 30 trains per hour for all alternatives – approximately the same number of trains operating through the portal today in the peak hour of operation. The reason that the number of trains stays constant among all alternatives is that the

Metrorail, BRT/Metrorail, and Phased Implementation alternatives would simply replace the Orange Line supplemental peak period service assumed in the Baseline Alternative with a new Metrorail Line that would originate in the Dulles Corridor (and would operate on the Orange Line alignment beginning at the East Falls Church Metrorail Station), while the BRT Alternative would not effect the baseline rail operating plan under the Baseline Alternative.

Although the Dulles Corridor Rapid Transit Project would not affect assumed rail operations under the Baseline Alternative, it should be noted that WMATA, in its Core Capacity Study, has determined that the Metrorail system should limit the number of trains operating through the Rosslyn portal to 26 trains per hour if it is to maintain 98 percent service reliability during peak periods. Specifically, the Core Capacity Study – the analyses of which were intentionally separate from those of the Draft EIS—suggests that system operations could be reduced to 26 trains per hour by extending peak period headways on the Orange and/or Dulles Lines from six to seven minutes, and by rerouting some Blue Line trains to the Yellow Line alignment between the Pentagon and L'Enfant Plaza. In the course of the Core Capacity analysis, a new river crossing was considered. Because rerouting the Blue Line trains provides the desired level of service reliability through 2025, the new river crossing was eliminated from further consideration. Such a change in operations would result in marginally lower rail capacity, service frequencies, and operations and maintenance costs for all alternatives (including the Baseline Alternative), as well as slightly lower corridor and system ridership.

#### 6.3.3.3 Other Effects on the Existing Metrorail System

Implementation of the Metrorail, BRT/Metrorail, and Phased Implementation alternatives would result in two additional effects on Metrorail service along the Orange Line. As noted above, each of these Alternatives would replace peak period supplemental Orange Line service with new Metrorail service in the Dulles Corridor and along the Orange Line alignment, beginning at the East Falls Church Metrorail Station. Because this service would operate continuously, service frequencies along the Orange Line (east of East Falls Church) would improve during the off-peak period, as Dulles trains would operate in the 12-minute headways "slot" into the Orange Line alignment at East Falls Church, which would result in a combined headway of 6 minutes east to Rosslyn and 4 minutes through the remainder of the shared Orange/Blue alignment through downtown Washington, D.C. This would compare with a 12-minute off-peak headway on the Orange Line east to Rosslyn and a 6-minute combined Blue/Orange Line headway through downtown Washington, D.C., as occurs today and would continue to occur under the Baseline and BRT alternatives.

While off-peak service frequencies east of (and including) East Falls Church Metrorail Station would improve, peak period service at the West Falls Church Metrorail Station would decline under the implementation of the Metrorail, BRT/Metrorail, and Phased Implementation alternatives. This is because each of these alternatives would replace a service (the supplemental peak period Orange Line service) with a Metrorail Line that would bypass West Falls Church and enter the Orange Line alignment at the East Falls Church Metrorail Station. This would result in peak period service being reduced by 50 percent at West Falls Church after the implementation of the Metrorail, BRT/Metrorail, and Phased Implementation alternatives, with headways declining from 3 minutes (as in the Baseline and BRT alternatives) to 6 minutes.

### 6.3.4 TRANSIT RIDERSHIP

The change in transit ridership resulting from the implementation of rapid transit service in the Dulles Corridor is a measure of fundamental importance in assessing the impact of each Build Alternative. Accordingly, each alternative was assessed to determine its potential influences on regional transit ridership, ridership at proposed stations in the corridor, and the transit mode share in the corridor.

#### 6.3.4.1 Regional Transit Ridership

Outlined in Table 6.3-8 are average weekday ridership estimates associated with each alternative for 2025. Measures considered in the analysis include changes in regional Metrorail/BRT trips, changes in total transit trips, and the number of new transit riders attracted to the regional system by the Dulles Corridor Rapid Transit Project.

The first two columns in Table 6.3-8 present ridership related specifically to the Dulles Corridor, while the remaining four columns present forecast activity for the entire region. The "Total Riders" column reflects ridership activity, as measured by project boardings and alightings, generated by each Build Alternative. This figure includes all corridor-related entries and exits to the BRT and/or Metrorail system, including passengers entering the system outside of the corridor but exiting at a corridor station or stop. BRT and Metrorail trips originating within the corridor are summarized in the "Boardings" column. Each round trip originating within the corridor includes at least one boarding. Where the origin and destination stations/stops lay completely within the corridor, two boardings occur and are represented in the table.

**Table 6.3-8: Average Weekday Transit Patronage Forecasts for Regional Transit System, Baseline and Build Alternatives – 2025**

| 2025 | Total Riders | Boardings | HBW Rail/BRT Trips | Total Rail/BRT Trips | Total Transit Trips | New Riders |
|---|---|---|---|---|---|---|
| Baseline | n.a. | n.a. | 578,800 | 929,100 | 1,279,700 | n.a. |
| BRT Alternative | | | | | | |
| BRT 1 | 49,400 | 28,000 | 592,600 | 956,300 | 1,292,200 | 12,500 |
| BRT 2 | 48,000 | 26,900 | 592,600 | 955,200 | 1,291,100 | 11,400 |
| BRT 3 | 47,100 | 25,800 | 591,900 | 954,800 | 1,290,600 | 10,900 |
| Metrorail Alternative | | | | | | |
| T1 | 86,300 | 52,100 | 609,700 | 990,200 | 1,317,000 | 37,300 |
| T6/T9 | 86,900 | 53,200 | 609,500 | 990,900 | 1,318,000 | 38,300 |
| T4 | 83,800 | 51,000 | 608,400 | 988,400 | 1,316,500 | 36,800 |
| BRT/Metrorail Alternative (BRT1/T4) | 70,500 | 42,200 | 601,000 | 977,100 | 1,304,800 | 25,100 |
| Phased Implementation (T4) | 83,800 | 51,000 | 608,400 | 688,400 | 1,316,500 | 36,800 |

The "HBW Rail/BRT Trips" column represents total daily regional home-based work BRT and/or Metrorail trips under each alternative. Home-based work trips are an important set of trips to consider in ridership analysis because they represent the most predominant use of public transportation: travel between home and work. The "Total Rail/BRT Trips" column represents all daily BRT and/or Metrorail trips, not just those used for the commute between home and work. "Total Transit Trips" reflect forecast ridership on the assumed regional transit network, and includes BRT and Metrorail trips, commuter rail trips, and trips made by local bus.

The "New Riders" column presents the number of new transit riders attracted to the regional transit network as a result of the implementation of each Build Alternative. The number of new riders is calculated by subtracting the Baseline "Total Transit Trips" from the "Total Transit Trips" estimated for each Build Alternative. The number of new riders is a key measure used by the Federal Transit Administration to evaluate the cost effectiveness of major transit capital investments.

The following provides an analysis of each of the transit ridership measures presented on the previous page in Table 6.3-8, by Build Alternative.

### BRT Alternative

Relative to the Baseline Alternative, all of the BRT alignments would increase the number of regional transit trips for all trip categories in 2025. It is estimated that the BRT Alternative would attract approximately 11,000 to 12,500 new riders to the regional transit system.

### Metrorail Alternative

The Metrorail Alternative is also expected to increase the number of regional transit trips; however, the increase in new riders is substantially higher for the Metrorail Alternative than for the BRT Alternative. Metrorail would attract approximately 37,000 to 38,000 new riders—roughly 3 to 3.5 times more than BRT, depending on the alignments.

As discussed in Section 6.2, a supplemental analysis was undertaken to estimate Metrorail ridership in the Dulles Corridor under a rail-related development scenario. The analysis shows that ridership on the Metrorail Alternative would increase by 14 to 18 percent over the Metrorail ridership estimates presented in Table 6.3-8, depending on the alignment. As noted earlier, the full results of the development-related ridership analyses are presented in the *Travel Demand Forecasting Methodology and Results Report* (March 2002).

### BRT/Metrorail

Like the BRT and Metrorail alternatives, the BRT/Metrorail would attract more regional transit riders than the Baseline Alternative. It is estimated that the alternative would attract approximately 25,000 new riders—more than the BRT Alternative, but less than the Metrorail Alternative.

### Phased implementation

The Phased Implementation Alternative would have identical ridership as the Metrorail Alternative in 2025. In terms of the actual phasing of this alternative, Table 6.3-9 shows that transit ridership would increase after initiation of each project phase. The totals shown below are for each alternative in its opening year; therefore, the totals are less than the 2025 projections shown in Table 6.3-8.

**Table 6.3-9: Transit Patronage Forecasts, Phased Implementation**

| 2005/06 | Total Riders | Boardings | HBW Rail/BRT Trips | Total Rail/BRT Trips | Total Transit Trips | New Riders |
|---|---|---|---|---|---|---|
| Baseline | n.a. | n.a. | 455,100 | 722,600 | 1,030,000 | n.a. |
| BRT | | | | | | |
| BRT 1 | 30,300 | 17,300 | 463,900 | 739,300 | 1,034,500 | 4,500 |
| BRT 2 | 30,100 | 17,100 | 464,000 | 739,000 | 1,034,400 | 4,400 |
| BRT 3 | 26,900 | 14,800 | 462,600 | 737,000 | 1,032,200 | 2,200 |
| BRT/Metrorail (BRT 1/T4) | 50,800 | 30,300 | 475,000 | 761,400 | 1,048,800 | 18,800 |
| **2010** | **Total Riders** | **Boardings** | **HBW Rail/BRT Trips** | **Total Rail/BRT Trips** | **Total Transit Trips** | **New Riders** |
| Baseline | n.a. | n.a. | 484,000 | 771,500 | 1,091,500 | n.a. |
| Metrorail | | | | | | |
| T1 | 71,300 | 43,400 | 514,300 | 826,100 | 1,123,100 | 31,600 |
| T6/T9 | 71,900 | 44,300 | 514,500 | 827,000 | 1,124,200 | 32,700 |
| T4 | 69,400 | 42,600 | 513,600 | 824,800 | 1,122,900 | 31,400 |

### 6.3.4.2 Corridor and Station Ridership

Corridor-specific transit ridership is an important measure of the impact of each Build Alternative within each station area in the corridor. The estimated number of daily boardings at proposed corridor stations is shown for the Build Alternatives in Table 6.3-10.

**Table 6.3-10: Forecast Daily Station Boardings in Dulles Corridor – 2025**

| Station/Stop | BRT | | | Metrorail | | | BRT/ Metrorail | Phased Implementation |
|---|---|---|---|---|---|---|---|---|
| | BRT 1 | BRT 2 | BRT 3 | T1 | T6/T9 | T4 | BRT 1/T4 | T4 |
| Tysons East | n.a. | n.a. | n.a. | 5,598 | 5,559 | 4,417 | 4,272 | 4,417 |
| Tysons Central A | n.a. | n.a. | n.a. | n.a. | n.a. | 2,878 | 2,737 | 2,878 |
| Tysons Central B | n.a. | n.a. | n.a. | n.a. | n.a. | 1,345 | 1,328 | 1,345 |
| Tysons Central C | n.a. | n.a. | n.a. | n.a. | 4,181 | 2,999 | 2,843 | 2,999 |
| Tysons Central D | n.a. | n.a. | n.a. | 8,537 | 6,589 | 3,368 | 3,149 | 3,368 |
| Tysons West | n.a. | n.a. | n.a. | 7,319 | 6,418 | 5,636 | 5,693 | 5,636 |
| Spring Hill Road/Tysons-West*Park | 4,487 | 3,735 | 4,159 | n.a. | n.a. | n.a. | n.a. | n.a. |
| Wiehle Avenue | 4,683 | 5,504 | 3,855 | 6,483 | 6,645 | 6,580 | 3,800 | 6,580 |
| Reston Parkway | 2,224 | 2,383 | 1,661 | 2,923 | 2,901 | 2,865 | 2,339 | 2,865 |
| Herndon-Monroe | 7,061 | 7,633 | 7,596 | 8,066 | 7,863 | 7,845 | 6,712 | 7,845 |
| Route 28 | 1,616 | n.a. | n.a. | 2,416 | 2,381 | 2,383 | 1,431 | 2,383 |
| Dulles Airport | 3,861 | 3,890 | 3,892 | 4,392 | 4,334 | 4,312 | 3,738 | 4,312 |
| Route 606 | 2,893 | 2,569 | 3,582 | 4,927 | 4,869 | 4,867 | 2,939 | 4,867 |
| Route 772 | 1,201 | 1,168 | 1,092 | 1,484 | 1,481 | 1,492 | 1,257 | 1,492 |

#### BRT Alternative

The regional ridership trends described in the previous section are also present at the corridor level. For all alignments, the BRT Alternative yields lower daily station boardings than the Metrorail Alternative.

There are some differences in station (and stop) boardings among the three BRT alignments. These differences are based on some fairly substantial variances in service levels at stations/stops for the three alignments, each of which has 80 BRT vehicles per hour at the West Falls Church Metrorail Station while still accommodating the different station and stop characteristics of each alignment. For example, under Alignment BRT 2, 37 BRT vehicles would serve the Wiehle Avenue Station in the peak hour. However, only 27 BRT vehicles per hour would serve this station under Alignment BRT 3, resulting in roughly 1,650 fewer daily boardings for this alignment. Similarly, the Spring Hill Road/Tysons-West*Park Transit Station would be served by 40 buses in the peak period under Alignment BRT 1, but only 12 buses per hour under Alignment BRT 2. This results in a difference of 750 daily boardings between the two alignments (although a significantly higher number of boardings per bus under BRT 2 than BRT 1).

#### Metrorail Alternative

Relative to the other Build Alternatives, the Metrorail Alternative would have the highest boardings at corridor stations. In some instances the difference in boardings between the Metrorail alignments and the BRT alignments are substantial, due to considerable differences in service levels.

Differences in ridership projections between the Metrorail alignments are relatively marginal, with the primary differences related to the location and number of stations in Tysons Corner. Alignment T1 would have the fewest number of stations in Tysons Corner, but the most activity at each station, because there would be fewer alternative Metrorail boarding points to "compete" for passengers. The addition of a station for Alignment T6/T9 would result in higher total ridership, but fewer boardings at each station.

The addition of two stations for Alignment T4 would not have similar ridership benefits. Though this alignment would have more stations than Alignments T1 and T6/T9, it would have fewer station boardings, and lower overall ridership than these alignments. The decrease in ridership is the result of the one-way service provided at the four Tysons Central stations for Alignment T4. Tysons Central A and B only provide access in the westbound direction, while Tysons Central C and D only provide service in the eastbound direction. A person traveling from Reston to his job on the north side of Tysons Central A could either exit the train at Tysons Central D and walk a long way to his office, or he could take the train to Tysons East, transfer to the westbound line, and exit the train at Tysons Central A, walking a much shorter distance to his office. Similarly, a Loudoun County resident who worked at Tysons Corner Center could easily take the train to work in the morning, exiting the train at Tysons Central D. At the end of the day, however, this employee would have to walk to Tysons Central A or board at Tysons Central D and travel east to the Tysons East Station, where he would transfer to a westbound train. Therefore, though access and geographical coverage appear to be better for Alignment T4, its configuration would be inconvenient for many potential patrons passengers, discouraging them from using transit.

There is one other important trade-off between the number of stations and overall ridership. The presence of Metrorail stations in Tysons Corner, while important for providing access to an area otherwise underserved by public transportation, would have a negative impact on passengers traveling through Tysons to reach another destination. The greater the number of stops required on a trip through Tysons the longer the travel time and the less attractive the trip becomes. Consequently, boardings at outer stations in the corridor are higher under Alignment T1 than the other Metrorail alignments, because through-passengers encounter fewer stops and thus enjoy a quicker trip on the way to their destination.

For the transit-related development scenario, Metrorail boardings would increase by 10 to 20 percent at most Fairfax County stations, and from three to eight percent at Loudoun County stations, relative to the Metrorail boardings presented in Table 6.3-10. There are two significant exceptions to these moderate increases: boardings at the Route 28 Station are forecast to increase by over 50 percent, and boardings at the Reston Parkway Station are expected to more than double. Increased boardings at Route 28 can be attributed both to increased development of residential and office densities adjacent to the station, as well as additional park-and-ride demand (the Route 28 Station is the only Metrorail station in Fairfax County which is under capacity in 2025). At Reston Parkway, the increase in boardings is due largely to a significant increase in walk-access to the station, a result of the high-density residential development planned for the area under the *Fairfax County Comprehensive Plan*.

### BRT/Metrorail Alternative

The differences between boardings at each station in the Metrorail portion of the BRT/Metrorail Alternative relative to the Metrorail Alternative are quite small and point to a similar level of attractiveness for the Metrorail and BRT/Metrorail alternatives.

For the BRT portion of the alternative, boardings at Mid-Corridor stations are generally lower than under the BRT Alternative. This effect is likely due to the increased travel time associated with the additional stops in

Tysons Corner for travelers bound for the Washington, D.C. core. Under the BRT Alternative, a passenger traveling between Wiehle Avenue and Metro Center would have a direct trip to the Orange Line at West Falls Church Metrorail Station. For the BRT/Metrorail Alternative (assuming BRT 1/T4), this same passenger would travel to Tysons West, transfer to Metrorail, then stop at three more Tysons Corner stations before merging with the Orange Line. It is also possible that the relatively short travel time on BRT before transferring to Metrorail at Tysons West makes the BRT/Metrorail Alternative less attractive to potential passengers.

### Phased Implementation Alternative

The Phased Implementation Alternative would carry the same ridership as the Metrorail Alternative in 2025, as Metrorail would be the final phase of this alternative. The same trends and differences in station boardings between alternatives seen in the 2025 analysis are also evident during the phased implementation of the project. The primary difference is that the absolute number of boardings under each phase is less, due to lower forecast population and employment in the project's opening years, as compared to 2025.

### 6.3.4.3 Corridor Mode Share

Data on corridor transit mode share (the portion of all corridor trips that are completed by transit) resulting from new transit investments provides a good analytic complement to the corridor ridership data provided in the previous section. Changes in mode share pinpoint whether overall corridor travel choices are changing and whether people have switched to transit from their automobile because of the presence of new corridor rapid transit service. Mode share analysis is important in that it distinguishes between absolute transit volumes and the overall effectiveness of transit service in meeting regional travel needs. If transit ridership goes up while its mode share declines, then transit is not succeeding in contributing to the performance of the overall transportation system.

Table 6.3-11 presents the home-based work transit mode share for trips attracted to several corridor sub-areas in 2025.

**Table 6.3-11: Mode Share for Home-Based Work Trips – 2025**

| Corridor Sub-Area | Baseline | BRT | | | Metrorail | | | BRT/ Metrorail | Phased Implementation |
|---|---|---|---|---|---|---|---|---|---|
| | | BRT 1 | BRT 2 | BRT 3 | T1 | T6/T9 | T4 | | T6/T9 |
| Tysons Corner | 10.0% | 9.2% | 9.2% | 9.2% | 15.3% | 15.8% | 15.3% | 14.1% | 15.8% |
| Reston | 2.9% | 5.1% | 5.2% | 3.9% | 7.2% | 7.2% | 7.1% | 5.2% | 7.2% |
| Herndon/Dulles | 1.7% | 3.6% | 2.2% | 1.9% | 4.9% | 4.8% | 4.8% | 3.1% | 4.8% |
| Loudoun East | 0.4% | 0.5% | 0.5% | 0.4% | 0.6% | 0.7% | 0.7% | 0.5% | 0.7% |

### BRT Alternative

Transit mode shares actually fall under all three BRT Alignments in Tysons Corner relative to the Baseline Alternative, but increase for all other corridor sub-areas. The decline in Tysons Corner is related to the fact that BRT only provides service to the edge of Tysons Corner, thus requiring a transfer or a long walk to the more developed portions of the area, while more frequent direct service to the central portion of Tysons Corner is provided under the Baseline Alternative. The increases in mode share in the other sub-areas are the result of a higher (in some areas substantially so) level of transit service in these areas under the BRT Alternative.

### Metrorail Alternative

Relative to the Baseline Alternative, transit mode shares increase considerably for most corridor sub-areas under the Metrorail Alternative. These increases are the result of the substantial improvement in transit levels of service and coverage provided under the Metrorail Alternative.

### BRT/Metrorail Alternative

Transit mode shares increase relative to the Baseline for all identified corridor sub-areas. The most significant mode share increases are in those sub-areas that will be served by the Metrorail portion of the alternative.

### Phased Implementation Alternative

The Phased Implementation Alternative would result in the same mode share as the Metrorail Alternative in 2025. Each step in phased implementation generally results in an increase in mode share, culminating in the highest mode share under the full Metrorail Alternative. Initially, the transit mode share in Tysons Corner would decline with the implementation of BRT, because this alternative provides less direct access to Tysons Corner than the Baseline Alternative. Note that the mode shares associated with the 2010 Metrorail Alternative are slightly higher than those for the 2025 Metrorail Alternative. This decline in the horizon year is likely caused by the elimination of tolls on the Dulles Toll Road in 2016, which is anticipated to increase highway travel demand through the corridor, resulting in a corresponding reduction in transit mode share.

## 6.3.5 EFFECTS ON OPERATIONS AND MAINTENANCE COSTS

The ridership figures outlined in Section 6.3.4 show the generally positive impacts of implementing a major transit capital investment in the Dulles Corridor. In this section, the estimated changes in operations and maintenance (O&M) costs associated with each of the Build Alternatives are outlined. These figures, in conjunction with ridership changes, help to identify the cost-effectiveness of a given alternative. Table 6.3-12 presents the annual operations and maintenance costs estimated for 2025 (in 2001 dollars).

**Table 6.3–12: Annual Operations and Maintenance Costs – 2025 (2001 dollars in millions)**

| Transit Service | Baseline | BRT | | | Metrorail | | | BRT/ Metrorail | Phased Implementation |
|---|---|---|---|---|---|---|---|---|---|
| | | BRT 1 | BRT 2 | BRT 3 | T1 | T6/T9 | T4 | | T6/T9 |
| Metrorail | $514.24 | $515.56 | $515.56 | $515.56 | $585.20 | $586.38 | $588.29 | $537.42 | $586.38 |
| Bus Rapid Transit | n.a. | $20.41 | $20.80 | $24.50 | n.a. | n.a. | n.a. | $23.01 | n.a. |
| WMATA Bus | $2.04 | $1.27 | $1.27 | $1.27 | $0.83 | $0.83 | $0.83 | $0.83 | $0.83 |
| Fairfax Connector | $13.60 | $12.55 | $12.55 | $12.55 | $10.79 | $10.79 | $10.79 | $10.76 | $10.79 |
| Loudoun County | $3.65 | $3.40 | $3.40 | $3.40 | $3.40 | $3.40 | $3.40 | $3.40 | $3.40 |
| **TOTAL** | **$533.53** | **$553.19** | **$553.58** | **$557.28** | **$600.22** | **$601.40** | **$603.31** | **$575.42** | **$601.40** |

See Chapter 8 for costs expressed in year-of-expenditure dollars.

### 6.3.5.1 BRT Alternative

Total O&M costs would increase for each BRT alignment relative to the Baseline Alternative, although there would be decreases in the cost of operations for local service providers. Metrobus, Fairfax Connector, and Loudoun County would experience a decrease in O&M costs because local and express service in the corridor would be replaced by BRT. Metrorail costs would increase marginally, as more Orange Line trains must be put

into service to meet BRT demand at West Falls Church Station. BRT 3 has the highest O&M costs of the three alignments because it requires higher revenue vehicle hours to serve the same travel markets as BRT 1 and BRT 2. These markets are more efficiently served under the latter two alignments.

#### 6.3.5.2 Metrorail Alternative

Though revenue vehicle hours are expected to decrease for the Metrorail Alternative, this alternative would have higher O&M costs than the other Build Alternatives due to the added cost of infrastructure maintenance for a rail line. This infrastructure includes stations, tracks, power distribution systems, structures, and right-of-way. The cost associated with maintaining more sophisticated rail vehicles is also higher than the cost of maintaining buses. However, the projected O&M costs for the Metrorail Alternative would only be 7 to 8 percent higher than those for the BRT Alternative.

The operation of the Metrorail S&I Yard at any of the proposed locations would contribute significantly to the project O&M costs. Deadheading (the number of daily, non-revenue vehicle miles or hours per vehicle) is a significant component of O&M costs. Table 6.3-13 presents the daily deadhead vehicle hours and miles and the costs associated with each for the three S&I Yards under consideration.

**Table 6.3-13: Daily Deadhead Vehicle Hours, Miles, and Costs Associated with the Alternative S&I Yard Sites (2001 dollars)**

| Alternative S&I Yard Site | Daily Deadhead Vehicle Hours | Daily Deadhead Vehicle Hour Costs* | Daily Deadhead Vehicle Miles | Daily Deadhead Vehicle Mile Costs* | Total Daily Deadhead Costs* |
|---|---:|---:|---:|---:|---:|
| Site 7 | 57.39 | $2,463 | 1,395 | $2,093 | $4,556 |
| Site 15 | 96.59 | $4,146 | 2,528 | $3,792 | $7,938 |
| Site 20 | 96.25 | $4,131 | 2,172 | $3,258 | $7,389 |

*Costs based on per unit cost from operating cost model updated using 2001 costs.

#### 6.3.5.3 BRT/Metrorail Alternative

Total O&M costs for the BRT/Metrorail Alternative are more than those for the BRT Alternative and less than the Metrorail Alternative. BRT costs for this alternative are less than those for the BRT Alternative, but this decrease is offset by a larger increase in Metrorail costs.

#### 6.3.5.4 Phased Implementation Alternative

The Phased Implementation Alternative would have identical O&M costs as the Metrorail Alternative in 2025. The same O&M cost patterns outlined for the 2025 Build Alternatives are seen for the phased implementation of the project. Specifically, phased implementation results in a steady increase in O&M costs between the BRT, BRT/Metrorail, and Metrorail phases.

## 6.4 EFFECTS ON OTHER TRANSPORTATION FACILITIES AND SERVICES

Other transportation facilities and services in the corridor include parking, bicycle and pedestrian facilities, and air transportation service. The effects of the Build Alternatives on each of these facilities and services, relative to the baseline conditions presented in Section 6.1.3, are discussed in the following sections. Where appropriate, the differences in impacts between alignments are discussed. For several of the facilities and services, however, there would be no difference in impacts between the alignment variations for an alternative.

### 6.4.1 PARKING

As identified earlier, Fairfax County plans to expand the Reston East Park-and-Ride facility to 2,300 spaces by 2010. Implementation of the Dulles Corridor Rapid Transit Project would accelerate the expansion of this facility as part of the construction Wiehle Avenue Station/Stop. For the BRT Alternative, or for phased implementation, the facility would be expanded by 2005. In addition to this expansion, the project would add between 5,750 and 9,750 other new parking spaces in the corridor by 2025 depending on the alternative and alignment. Table 6.4-1 summarizes the planned parking expansion program of the Dulles Corridor Rapid Transit Project.

**Table 6.4-1: Planned Parking Capacity for the Dulles Corridor Rapid Transit Project**

| Park-and-Ride Stations | 2005 | 2006 | 2010 | 2025 |
|---|---|---|---|---|
| Tysons West | – | 2,000 | 2,000 | 2,000 |
| Wiehle Ave (Reston East) | 2,300 | 2,300 | 2,300 | 2,300 |
| Herndon-Monroe | 1,750 | 1,750 | 3,500 | 3,500 |
| Route 28 | 300 | 1,200 | 1,200 | 2,000 |
| Route 606 | 750 | 2,750 | 4,750 | 4,750 |
| **TOTAL** | **5,100** | **10,000** | **13,750** | **14,550** |

Parking totals in the table above reflect maximum planned capacities for the Build Alternatives. The actual number of spaces constructed may be lower, depending on the parking demand generated by the locally preferred alternative chosen for implementation. The parking capacities for Route 606 assume the capacity at the Dulles North Transit Center, in addition to any parking built for the Dulles Corridor Rapid Transit Project. When BRT opens in 2005, it is assumed that the Route 606 BRT Stop will be located at the Dulles North Transit Center. When BRT/Metrorail opens in 2006, it is assumed that a new 2,000 space park-and-ride will be built to the west of the transit center, and the BRT stop will move to that location. Full Metrorail service would replace the BRT stop in 2010, and 2,000 additional spaces would be built. The Dulles North Transit Center would continue to operate through 2025 as an overflow parking facility.

For the BRT Alternative, BRT 1 would result in the construction of up to 12,550 parking spaces in the corridor by 2025. BRT 2 and BRT 3 do not include construction of a station at Route 28; therefore, implementation of either BRT alignment would reduce the amount of parking supplied in the corridor by 300 to 2,000 spaces, depending on the design year.

The Metrorail and BRT/Metrorail alternatives would provide a slightly higher increase in parking capacity than the BRT Alternative, because an additional 2,000 spaces would be built at the Tysons West Station.

For all Metrorail and most BRT alignments parking fees would be charged at corridor parking facilities. Parking costs at stations and stops throughout the corridor are assumed to be $2.25 per day (the current charge levied at Fairfax County Metrorail park-and-rides), and increase every three years at the 3-year average of the Consumer Price Index.

### 6.4.2 BICYCLE AND PEDESTRIAN FACILITIES

The Dulles Corridor Rapid Transit Project is not expected to have a significant impact on existing and planned bicycle and pedestrian facilities in the corridor. Implementation of any of the Build Alternatives would include the construction of ancillary pedestrian facilities providing access to planned stations and stops. These facilities

will be coordinated with existing facilities, as well as with those planned and implemented by Fairfax and Loudoun counties. All pedestrian facilities built for the Dulles Corridor Rapid Transit Project will be compliant with requirements of the Americans with Disabilities Act of 1991.

None of the Build Alternatives would affect the alignment and operation of the W&OD Trail. However, the Metrorail Alternative would result in the provision of greater regional transit access to the western portion of the trail. The Metrorail system has a liberal "Bike-on-Rail" policy, which allows passengers, during designated hours, to bring bicycles on to the system. Both the Wiehle Avenue and Reston Parkway stations are located adjacent to the W&OD Trail, and, therefore, would serve as convenient bike/transit transfer points for passengers choosing to split their trip between bicycles and rail.

### 6.4.3 AIR TRANSPORTATION

The Dulles Corridor Rapid Transit Project would have no impact on air transportation at Dulles Airport. However, the project would provide improved transit access to and from Dulles Airport for most of the metropolitan area. Specifically, any of the proposed Build Alternatives will provide seamless transit access to and from anywhere on the existing Metrorail system, including downtown Washington, D.C.; regional employment and activity centers such as Reston, Tysons Corner, Ballston, Rosslyn, Crystal City, Pentagon City, Alexandria, Bethesda, Rockville, and Silver Spring; and National Airport. The project would also provide a connection to MARC Commuter Rail services at the Union Station and New Carrollton Metrorail stations. MARC provides a rail link from the Metrorail system to BWI Airport in Maryland.

As demonstrated in Table 6.3-4 in Section 6.3.2.4, each of the Build Alternatives produce travel timesavings, as compared to the Baseline Alternative, for trips between Dulles Airport and several locations throughout the corridor and the region. As shown in Table 6.4-2, below, each of the Build Alternatives also results in a higher transit mode share for airport passengers beginning and/or ending their trip at Dulles Airport.

The table shows that each of the Build Alternatives and alignment options would shift passenger access to Dulles Airport from other modes to fixed-guideway transit. Most significantly, access to the airport by taxi falls approximately 15 to 20 percent (depending upon the alternative and alignment) by 2025, while access via private automobile falls by eight to 10 percent. Access by private shuttle services also decreases as the Build Alternatives result in the elimination of Washington Flyer service.

**Table 6.4-2: Air Passenger Mode of Access – 2025 (in percentages)**

| Mode of Arrival | Baseline | BRT | | | Metrorail | | | BRT/ Metrorail | Phased Implementation |
|---|---|---|---|---|---|---|---|---|---|
| | | BRT 1 | BRT 2 | BRT 3 | T1 | T6/T9 | T4 | BRT 1/T4 | T4 |
| Private Vehicle | 50.0 | 45.4 | 45.3 | 45.3 | 45.0 | 45.1 | 45.1 | 45.6 | 45.1 |
| Rental Car | 12.1 | 11.1 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.1 | 11.0 |
| Taxi | 23.3 | 19.5 | 19.4 | 19.6 | 18.9 | 18.9 | 19.0 | 19.7 | 19.0 |
| Private Shuttles (Washington Flyer, hotel, etc.) | 3.3 | 1.3 | 1.3 | 1.2 | 1.2 | 1.2 | 1.2 | 1.4 | 1.2 |
| Courtesy Bus | 11.3 | 11.1 | 11.1 | 11.1 | 11.0 | 11.0 | 11.0 | 11.1 | 11.0 |
| Transit | 0.0 | 11.6 | 11.8 | 11.8 | 13.0 | 12.8 | 12.7 | 11.1 | 12.7 |

The BRT Alternative would result in all of the effects described in the preceding paragraph, and is forecast to generate just under 4,000 daily boardings at the airport in 2025.

The Metrorail Alternative (particularly Alignment T1) would provide the fastest travel times to Dulles Airport in 2025. Each of the Metrorail alignments would serve between 4,300 and 4,400 daily boardings, and would result in the highest air passenger transit mode share among the alternatives.

Though the BRT/Metrorail Alternative would have several positive effects related to transit access at Dulles Airport, it would generate slightly fewer boardings and would have longer travel times than the BRT Alternative. In addition, the BRT Alternative would serve a higher transit market share than the BRT/Metrorail Alternative. This is consistent with the previous finding that core-bound (or originating) travel times for air passengers would be higher under BRT/Metrorail than BRT. For BRT 2 and BRT 3, Dulles air passengers can take advantage of limited stop BRT service between the airport and the West Falls Church Metrorail Station. For the BRT/Metrorail Alternative, however, that transfer occurs at Tysons West, thus, forcing passengers onto an "all stops" section of service much earlier (for eastbound passengers) or later (for westbound passengers) than the BRT Alternative.

The Phased Implementation Alternative would result in the same effects as the Metrorail Alternative in 2025. During phased implementation, transit travel times would improve each phase of the project, except for the Rosslyn-Dulles Airport trip. For this O/D pair, implementation of the BRT/Metrorail Alternative in 2006 would increase travel times as compared with the BRT Alternative, although times would decrease below BRT levels for the Metrorail Alternative.

Table 6.4-3 shows that phased implementation of the project results in higher transit mode shares for air passengers in the opening year of each alternative than in the forecast year of 2025 (although overall transit passenger volumes continue to increase). This is most likely the result of increasing traffic volumes on the DAAR as each phase is implemented. Shortly after implementation of Metrorail in 2010, MWAA is expected to add a third lane to the DAAR, thereby adding roadway capacity, reducing congestion, and slightly diminishing the attractiveness of transit as a travel-time competitive mode of access to Dulles Airport in 2025.

**Table 6.4-3: Air Passenger Mode of Access – Phased Implementation**

| Mode of Access | BRT (2005) | BRT/Metrorail (2006) | Metrorail (2010) |
|---|---:|---:|---:|
| Private Vehicle | 45.6 % | 45.3 % | 44.8 % |
| Rental Car | 11.1 % | 11.0 % | 10.8 % |
| Taxi | 19.5 % | 19.6 % | 19.0 % |
| Private Shuttles (Washington Flyer, Hotel, etc.) | 1.8 % | 1.8 % | 1.5 % |
| Courtesy Bus | 10.0 % | 10.0 % | 10.0 % |
| Transit | 11.9 % | 12.3 % | 13.9 % |

## 6.5 CONSTRUCTION EFFECTS

Implementation of the Dulles Corridor Rapid Transit Project would result in some disruptions to the operation of the transit and highway facilities in the corridor. This section describes the construction impacts associated with each of the Build Alternatives, as well as the impact to BRT operations during the conversion from BRT

to Metrorail under phased implementation. The terms "minimal" and "insignificant" impacts refer to limited off-peak construction periods or other work producing minor disturbances in the transportation system.

### 6.5.1 BRT ALTERNATIVE

BRT revenue service under all alignments will terminate at, or originate from, the existing bus transfer facility at the north side of the West Falls Church Metrorail Station. Under the BRT Alternative, this facility would be enlarged to meet forecast vehicle demand, and minimal, short-term effects to baseline bus operations are anticipated. Associated BRT layover and welfare facilities would be constructed in the infield of the Dulles Connector Road/I-66 interchange, without impacting the operation of either roadway.

BRT 1 includes construction of the Spring Hill Road Station in the median of the DAAR (where the DAAR crosses Spring Hill Road/International Drive), which would require some widening of the median (also known as "bubbling"). It is anticipated that such roadway modifications would require approximately six months of lane closures, primarily at night. BRT 1 also includes a pedestrian bridge connecting the Spring Hill Road Station to the feeder bus and Kiss & Ride facilities at the existing Tysons-West*Park Transit Station; its construction and later removal would require some closures of eastbound lanes of the DAAR and Dulles Toll Road. BRT 2 and BRT 3, on the other hand, would operate out of the Tysons-West*Park facility, and would not require major construction at this location.

BRT 1 includes four stations along the median of the DAAR west of Tysons Corner: Wiehle Avenue, Reston Parkway, Herndon-Monroe, and Route 28. Construction of each station, and their associated acceleration/deceleration lanes, would require widening of the DAAR and is anticipated to require lane closures for four to six months in each station area. BRT 2 and BRT 3 feature fewer median stations, but the construction impacts for the Wiehle Avenue, Reston-Parkway, and Herndon-Monroe stations in BRT 2 and the Reston Parkway station in BRT 3 would be almost identical. The construction impacts of parking, Kiss & Ride, and bus facilities associated with each Mid-Corridor station are expected to be minimal, except for some short-term disruption of bus operations during the construction of expanded bus facilities at Herndon-Monroe Station under BRT 3. The construction of pedestrian overpasses between each median station and its north- and south-side parking, Kiss & Ride, and bus transfer facilities would also require limited off-peak lane closures on the DAAR and Dulles Toll Road, a minimal impact.

The construction of BRT boarding areas at Dulles Airport is anticipated to cause very brief off-peak lane closures on airport roadways, but this impact would be minimal.

All proposed BRT alignments include off-line stops operating out of parking and bus facilities near the Dulles Greenway in Loudoun County. Construction of facilities at Route 772 and, in the future, expanded facilities near the Dulles North Transit Center, is not anticipated to impact the operation of the existing and planned local road network. Upon opening in 2005, BRT would operate out of the existing Dulles North Transit Center. Construction of BRT bays at the transit center is not expected to disrupt bus service currently using the facility.

### 6.5.2 METRORAIL ALTERNATIVE

The Metrorail Alternative would merge with the Orange Line at a point between the East and West Falls Church Metrorail stations. This connection would require new special track work including turnouts and a double crossover on, and some realignment of, the existing Orange Line track. WMATA would be able to

maintain Orange Line operations by single-tracking trains to implement such improvements. The overnight period would be utilized for construction that would require closure of both tracks. This would most likely occur on weekends, when 12-minute headways can be maintained with no disruptions to passenger service. WMATA presently maintains a rail yard a few hundred yards north of the West Falls Church Metrorail Station, adjacent to I-66. There would be some internal modifications to accommodate the Metrorail Alternative, but all such construction would occur on WMATA property and would not affect either rail transit or roadway operations.

The track leading from the WMATA yard to a point in the Dulles Connector Road median, roughly 1,000 feet north of the West Falls Church Station would cross under the eastbound lanes of the Connector Road. Tunneling options will be evaluated as more detailed design develops. However, cut-and-cover may represent the best method of constructing the rail link from the yard to the median. A cut-and-cover technique would require building a Dulles Connector Road detour for the eastbound lanes, and could be accomplished during weekends and nighttime hours. Consequently, traffic impacts associated with construction of Metrorail tracks between the yard and the Dulles Connector median are expected to be prolonged but insignificant.

Each of the Metrorail alignments has construction impacts in Tysons Corner. Alignment T1 requires 0.7 miles of tunnel; Alignment T6 requires 1.1 miles (including the Tysons Central C Station); and Alignment T9 and T9 Design Option require approximately 0.3 miles of excavated section. (Alignment T4 would be completely elevated.) The underground sections for Alignments T1 and T6 may be tunneled, or may be excavated by cut-and-cover techniques, while the shallow tunnel for Alignment T9 and T9 Design Option would require a cut-and-cover method. Cut-and-cover construction would require lane closures that would disrupt traffic to a considerable extent. The Alignment T9 and T9 Design Option cut-and-cover construction would disrupt operation of the ramps leading from Route 7 to Route 123.

Alignment T9 is incompatible with two planned highway interchanges. The first arises west of the proposed Tysons East Station, where VDOT has plans to upgrade the I-495/Route 123 interchange. VDOT's improvements would add access ramps that are in conflict with the planned aerial alignment for T9, unless some accommodation is found between VDOT's plans and the T9 plans. The second conflict concerns the Route 7/Route 123 interchange. The design of Alignment T9 where it crosses the ramps leading from Route 7 to Route 123 would preclude VDOT plans to widen Route 123 lanes (plans are not yet funded). Estimates of the work required and potential disruption caused by construction of Alignment T9 will require further coordination with VDOT. The T9 Design Option would be collocated with VDOT's planned improvements for the I-495/Routes 7/123 interchanges. However, the profile of one ramp at the Route 7/123 interchange would need to be raised since the T9 Design Option western portal would interfere with the current Route 7 westbound to Route 123 southbound ramp.

Construction of feeder bus bays and Kiss & Ride facilities associated with the Tysons Corner area Metrorail stations is expected to have minimal impacts. Construction of Kiss & Ride and bus facilities on the south side of Route 123 at the Tysons East Station may require occasional lane closures on Route 123 and Colshire Road. Similarly, construction of the multi-story intermodal facility at Tysons West Station could force lane closures on Tyco Road in daytime and evening hours for an extended period. For these and all other stations in Tysons Corner, construction of pedestrian bridges would include periodic off-peak closures of eastbound and westbound lanes in the vicinity of stations.

Construction of the Metrorail Alternative in the Mid-Corridor area would result in all of the station area impacts described under the BRT Alternative: road widening would close lanes for a four to six month period,

and pedestrian bridge construction would occasionally close lanes in off-peak hours. In addition, implementation of the Metrorail Alternative would require the construction of one pocket track just west of the Wiehle Avenue Station, which would result in an additional three months disruption for road widening.

The Metrorail line would require a 1.72-mile tunnel alignment at Dulles Airport with a portal well north of the terminal so as not to interfere with airport traffic. However, construction would displace parking spaces close to the airport terminal, both during the decking operation prior to station and tunnel construction, and then during that construction. The current assumption is that construction would proceed using a combination of cut-and-cover and conventional tunneling methods. Construction impacts under this approach would include some vehicular and pedestrian (and even some air) traffic disruption, as tunneling proceeds across roads leading to the main terminal, parking lots, and the northern portion of the airport apron. Minor disruptions along the Metrorail alignment would be expected to continue for at least two years.

The northwestern-most subsection of the Dulles Airport Metrorail alignment would be an aerial alignment and pocket track providing a connection between the airport grounds and the Dulles Greenway median. Construction of this elevated structure is not anticipated to impact Greenway operations except for minimal off-peak lane closures across eastbound lanes during work over those lanes.

Relocation of the lanes on the Dulles Greenway would be necessary around the Route 606 and Route 772 stations in Loudoun County and could cause some disruption of traffic as lanes are closed for approximately four to six months near each facility. Construction of pedestrian bridges to the median would have minimal impacts, because the lane closures will be in the off-peak period.

### 6.5.3 BRT/METRORAIL ALTERNATIVE

Construction of the BRT/Metrorail Alternative would result in the same impacts as described previously for Metrorail from the Orange Line through Tysons Corner, and for BRT in the Mid-Corridor, Dulles Airport, and Loudoun County sections of the alignment. In addition, the BRT/Metrorail Alternative includes a transfer station from BRT to Metrorail at the Tysons West Station. BRT service from Tysons West is proposed to connect to the DAAR via an aerial ramp. Construction of this ramp is likely to require occasional off-peak period closures of the eastbound lanes of the DAAR and Toll Road.

### 6.5.4 PHASED IMPLEMENTATION ALTERNATIVE

Phased implementation of the Dulles Corridor Rapid Transit Project would result in the conversion of BRT service to Metrorail. The transition from BRT to Metrorail is not a significant issue for the eastern half of the corridor. On the Dulles Connector Road, BRT would operate in the dedicated shoulder and general-purpose lanes while Metrorail would be constructed in the median of the road. BRT would operate at the northern edge of Tysons Corner (serving the Spring Hill Station in BRT 1 and the Tysons-West*Park Transit Station in BRT 2 and BRT 3), while Metrorail penetrates Tysons via Route 123, Route 7, and (for Alignment T4) Westpark Drive.

The transition from BRT to Metrorail in the corridor between the Wiehle Avenue and Route 28 station areas could interrupt BRT operations in important ways. Although conversion of a median station from BRT to Metrorail requires no further road bubbling, construction of the rail bed at each station site will prevent BRT vehicles from accessing station platforms during this time, and until such time that Metrorail is in service. Under the conversion of BRT 1 to Metrorail, it would be necessary to cease BRT operations at the median

portion of the Mid-Corridor stations for at least twelve months during conversion to rail. Under BRT 2, three stations would be converted. Metrorail conversion would not disrupt BRT 3 operations because two stops are off the median and the Reston Parkway Station is a multi-level structure designed to permit simultaneous BRT and Metrorail service. BRT service modifications have not yet been determined, but would likely involve the temporary elimination of some stops (at Route 28) and the redirection of operations from median stations to adjacent park-and-ride facilities (at Wiehle Avenue and Herndon-Monroe).

The BRT platforms at Dulles Airport and in Loudoun County are located at different sites than at the Metrorail stations they would be replaced by; consequently, no disruption to BRT service is anticipated during the conversion from BRT to Metrorail operations.

### 6.5.5 CONSTRUCTION MITIGATION

Maintenance of traffic plans would be developed for all construction activities that would impact roadways. The construction of the proposed stations would need to be coordinated with the following agencies: VDOT regarding lane closures in Tysons Corner and on the Dulles Toll Road; MWAA regarding possible disruptions in airport service and construction on the DAAR; and with TRIPII regarding construction events on the Dulles Greenway. To the extent possible, all construction requiring lane closures would be done at night, on weekends, or in the off-peak period.

# Section 4(f) Evaluation 7

# 7 SECTION 4(f) EVALUATION

This chapter discusses the effects of the Dulles Corridor Rapid Transit Project on parklands and historic properties needed to comply with the provisions of Section 4(f) of the U.S. Department of Transportation Act of 1966 (commonly referred to as Section 4(f)), and Section 6(f) of the U.S. Land and Water Conservation Funds Act of 1964 (commonly referred to as Section 6(f)).

## 7.1 LEGAL AND REGULATORY REQUIREMENTS

Section 4(f) (49 U.S.C. 303) of the U.S. Department of Transportation Act of 1966, protects public parks and recreational lands, wildlife habitat, and historic sites of national, state, or local significance from acquisition and conversion to transportation use. Section 4(f) is implemented by regulation 23 CFR 771.135.

Section 6(f) of the U.S. Land and Water Conservation Fund Act of 1965 (16 U.S.C. 4601-4 to 4601-11) preserves, develops, and assures the quality and quantity of outdoor recreation resources through purchase and improvement of recreational lands, wildlife and waterfowl refuges, and other similar resources. More detailed information regarding the regulatory requirements for both Section 4(f) and Section 6(f) resources is included in the following sections.

### 7.1.1 SECTION 4(f)

Section 4(f) applies to publicly owned parks, recreational areas, and wildlife or waterfowl refuges. Section 4(f) does not apply to these land uses if they are privately owned. Publicly owned land includes parks, recreation areas, or wildlife or waterfowl refuges when the land has been officially designated as such or when the federal, state, or local officials having jurisdiction over the land determine that one of its major purposes or functions is for park, recreation, or refuge purposes.

Section 4(f) also applies to all historic sites, whether or not they are publicly owned, that are on, or have been determined to be eligible for listing on, the National Register of Historic Places (National Register). In historic districts, Section 4(f) normally does not apply where an affected or potentially affected property is not individually historic, is not an integral part of the historic district in which it is located, and does not contribute to the factors that distinguish the district historic. Section 4(f) also applies to all archaeological sites on or eligible for inclusion on the National Register if it has been determined, after consultation with the State Historic Preservation Officer (SHPO) and, if applicable, the Advisory Council for Historic Preservation (ACHP), that the site warrants preservation in place. If the site is determined to be important chiefly because of what can be learned by data recovery and has minimal value for preservation in place, Section 4(f) does not apply.

#### 7.1.1.1 Use under Section 4(f)

Section 4(f) applies to protected resources when a "use" occurs. "Use" can be permanent, temporary, or constructive, as defined below.

### Permanent Use

Permanent use includes acquisition and incorporation of the resource into the transportation facility; it includes fee simple and permanent easement use.

### Temporary Use

Temporary use occurs when a transportation project temporarily occupies any portion of the resource and results in an adverse condition. For a temporary use of Section 4(f) land not to be considered adverse, it must meet the following conditions:

- The duration of the occupancy must be less than the time needed for the construction of the project and there must not be a change in ownership;
- Both the nature and magnitude of the changes to Section 4(f) resources must be minimal;
- There cannot be anticipated permanent adverse physical changes or interference with activities or purposes of the resource on a temporary or permanent basis;
- The land must be restored to the same or better condition; and
- There must be a documented agreement of the appropriate federal, state, or local officials having jurisdiction over the resource regarding the above conditions.

### Constructive Use

Constructive use occurs when the proximity effects of the transportation project, such as noise, vibration, air quality, or visual impacts, are so great that the use of the property is substantially impaired. Such substantial impairment would occur when the proximity impacts to Section 4(f) lands are sufficiently serious that the value of the site, in terms of its prior significance and enjoyment, are substantially reduced or lost. This threshold of substantial impairment is a high one and is reserved for the most severe proximity effects. Examples provided in the regulations implementing Section 4(f) are discussed below:

- The projected noise level increase from the project would substantially interfere with the use and enjoyment of a resource protected by Section 4(f), such as enjoyment of a historic site where a quiet setting is a generally recognized feature or attribute of the site's significance;
- The proximity of the proposed project would impair the aesthetic quality of a resource, where aesthetic qualities are considered important contributing elements to the value of a resource, such as impairment to visual or aesthetic qualities that obstructs or eliminates the primary views of an architecturally noteworthy historical building;
- The project would result in a restriction of access to the Section 4(f) resource, which would substantially diminish the utility of the resource;
- A vibration impact from the operation of a project would substantially impair the use of a Section 4(f) resource, such as projected vibration levels from a rail transit project great enough to affect the structural integrity of a historic building; or
- The intrusion of the project would substantially diminish the value of wildlife habitat in a wildlife or waterfowl refuge adjacent to the project or would substantially interfere with the access to a wildlife or waterfowl refuge.

#### 7.1.1.2 Feasible and Prudent Alternatives under Section 4(f)

According to Section 4(f), the use of public lands for transportation purposes may only occur if there is no "feasible and prudent" alternative to such use and if the project includes all possible planning to minimize harm to resources from such use. The determination of feasible and prudent alternatives must include supporting information that demonstrates unique problems or unusual factors involved with implementing avoidance alternatives or that the cost, social, economic, and environmental impacts or community disruption resulting from such alternatives would reach extraordinary magnitudes. An alternative may be rejected as not being feasible and prudent if it meets one of the following criteria:

- Would not meet the project purpose and need;
- Would have excessive costs of construction of extraordinary magnitude; or
- Would result in severe operational or safety problems; unacceptable adverse social, economic, or environmental impacts; serious community disruption; or accumulation of the aforementioned impacts that, when combined, would reach an unacceptable level.

### 7.1.2 SECTION 6(f)

Section 6(f) of the U.S. Land and Water Conservation Fund Act of 1965 preserves, develops, and assures the quality and quantity of outdoor recreation resources through purchase and improvement of recreational lands, wildlife and waterfowl refuges, and other similar resources. Section 6(f) contains provisions to protect and maintain the quality of federal, state, and local investments in parkland and/or recreational resources. The Act established a funding source for federal acquisition of park and recreation lands and matching grants to state and local governments for recreation planning, acquisition, and development. Once purchased using these funds, these lands are protected from conversion to uses other than public outdoor recreational uses. Any such conversion must be in accordance with an existing comprehensive statewide outdoor recreation plan and must be approved by the Secretary of the Interior. If a conversion occurs, the land must be replaced with other recreational properties of at least equal fair market value and with reasonably equivalent usefulness and location. The conversion requirements for Section 6(f) land are outlined in 36 CFR 59.3.

## 7.2 PROPOSED ACTION

The Commonwealth of Virginia through the Department of Rail and Public Transportation (DRPT), and in cooperation with the Washington Metropolitan Area Transit Authority (WMATA) is proposing to implement a 24-mile rapid transit service in the rapidly growing Dulles Corridor in Fairfax and Loudoun counties, Virginia. In addition to the no-build (Baseline) Alternative, four Build Alternatives are being evaluated to serve portions of Fairfax and Loudoun counties and Dulles Airport. The Build Alternatives include Bus Rapid Transit (BRT), Metrorail, a combination of BRT and Metrorail, and Phased Implementation of transit improvements beginning with BRT and ending with Metrorail. The BRT Alternative would operate in the existing lanes of the Dulles Connector Road, the Dulles Airport Access Road (DAAR), the Dulles Toll Road, and the Dulles Greenway between the Metrorail Orange Line in Fairfax County and Route 772 in Loudoun County (see Figure 7.2-1 and Figure 7.2-2).

The Metrorail Alternative would include an extension of the regional Metrorail system through Tysons Corner, along the DAAR to Dulles Airport, and along the Dulles Greenway into eastern Loudoun County (see Figure 7.2-3). The BRT/Metrorail Alternative would extend Metrorail through Tysons Corner and BRT west of Tysons Corner to Route 772 in Loudoun County (see Figure 7.2-4).

The Phased Implementation Alternative would combine the other three Build Alternatives into a program of rapid transit improvements that would be implemented in stages (See Figure 7.2-5). The BRT Alternative would be constructed first; then Metrorail would be constructed from the Orange Line through Tysons Corner, connecting to BRT service between Tysons Corner and Loudoun County; and finally, Metrorail would be constructed between Tysons Corner and Loudoun County replacing BRT service in the corridor. Each phase would include and build on the improvements constructed in the previous phases. The study area for Section 4(f) and 6(f) resources was determined as a 600-foot-wide corridor that included the Dulles Connector Road, DAAR/Dulles Toll Road, and Dulles Greenway, expanded to widths of 800 to 2,000 feet depending on the proposed facilities. The study area was delineated based on the potential for disturbance from all conceivable project facilities.

## 7.3 DESCRIPTION OF SECTION 4(f)/SECTION 6(f) RESOURCES

The Section 4(f) and/or Section 6(f) resources identified within the corridor include publicly owned parklands, historic resources, and archaeological sites. Historic sites must be listed on or eligible for listing on the National Register of Historic Places to qualify as a Section 4(f) resource. Figure 7.3-1a and Figure 7.3-1b illustrate the locations of the parkland and historic resources potentially affected by the Dulles Corridor Rapid Transit Project. Further information on the confidentiality of archaeological resource locations may be obtained from the Virginia Department of Historic Resources in Richmond.

### 7.3.1 PARKLAND RESOURCES

The following section describes the parks that were evaluated under the provisions of Section 4(f) are discussed below.

#### 7.3.1.1 George Mason High School Athletic Fields

George Mason High School is located on a 17-acre campus south of I-66 at 7124 Leesburg Pike. This school includes playing fields that are available for general public use. The school complex is owned by the City of Falls Church.

#### 7.3.1.2 Mount Royal Park

Mount Royal Park is located north of I-66 and west of the Dulles Connector Road. This small, undeveloped park (3 acres) is adjacent to the Lemon Road Elementary School in Falls Church and the existing Metrorail West Falls Church Service and Inspection (S&I) Yard. Planned improvements to this open recreational area include the addition of a picnic area; play area, tennis courts, and an exercise area. The Fairfax County Park Authority (FCPA) owns this park.

#### 7.3.1.3 Pimmit Run Stream Valley Park

Pimmit Run Stream Valley Park is a linear park of approximately 68 acres that follows the course of Pimmit Run. The stream runs parallel to a concrete swale spanned by the Dulles Connector Road. The parkland lies north of Idylwood Road, with discontinuous portions on either side of the Dulles Connector Road, which divides it; a trail going under the roadways connects the two sections of the park, but this trail is not deemed to be parkland. Pimmit Run is not navigable under low water conditions and clearly marked trails do not currently exist under the Dulles Connector Road. This undeveloped park is owned and maintained by the FCPA and is used as a hiking trail and natural area.

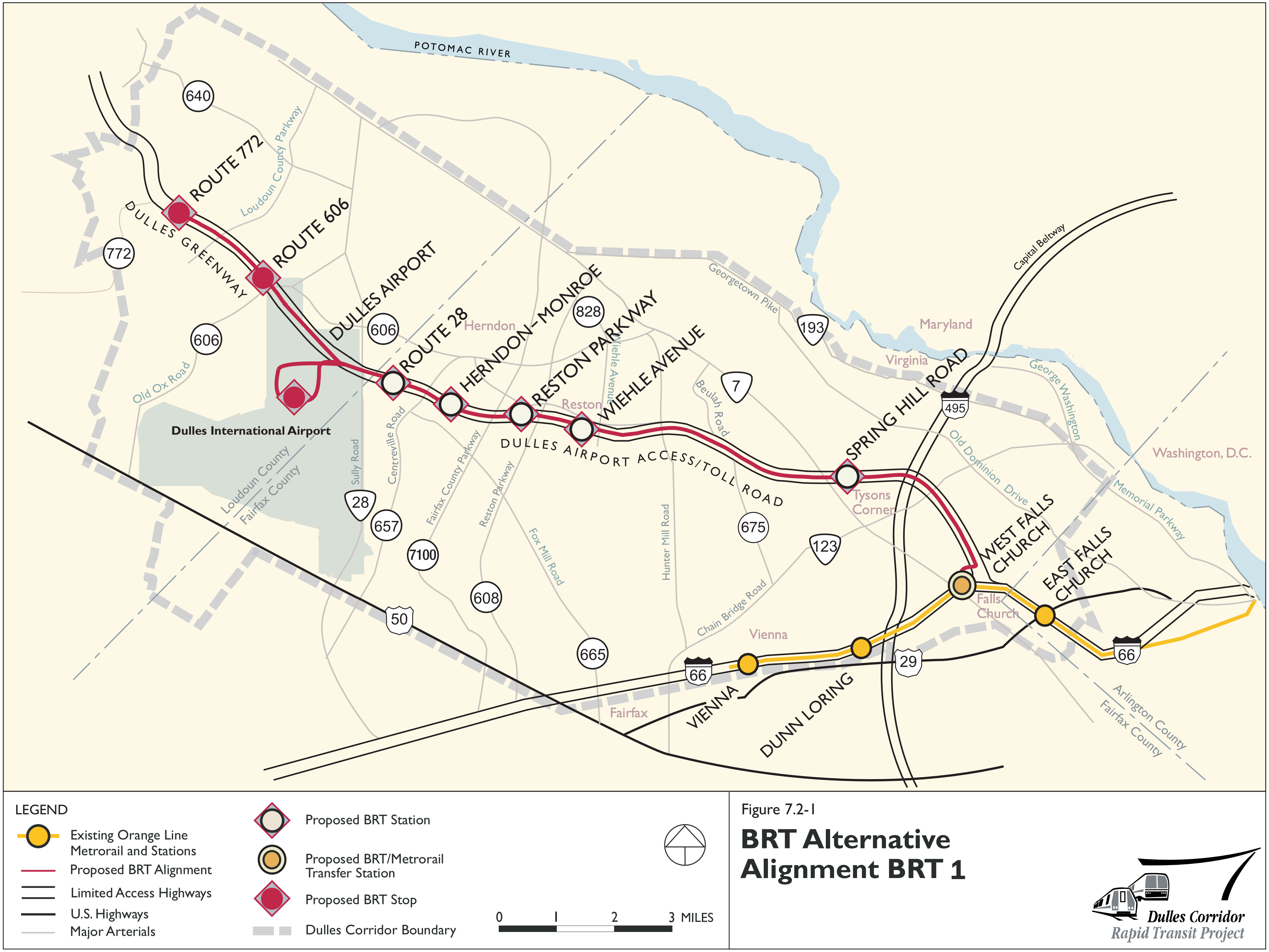



Figure 7.2-1

# BRT Alternative Alignment BRT 1

Dulles Corridor
*Rapid Transit Project*

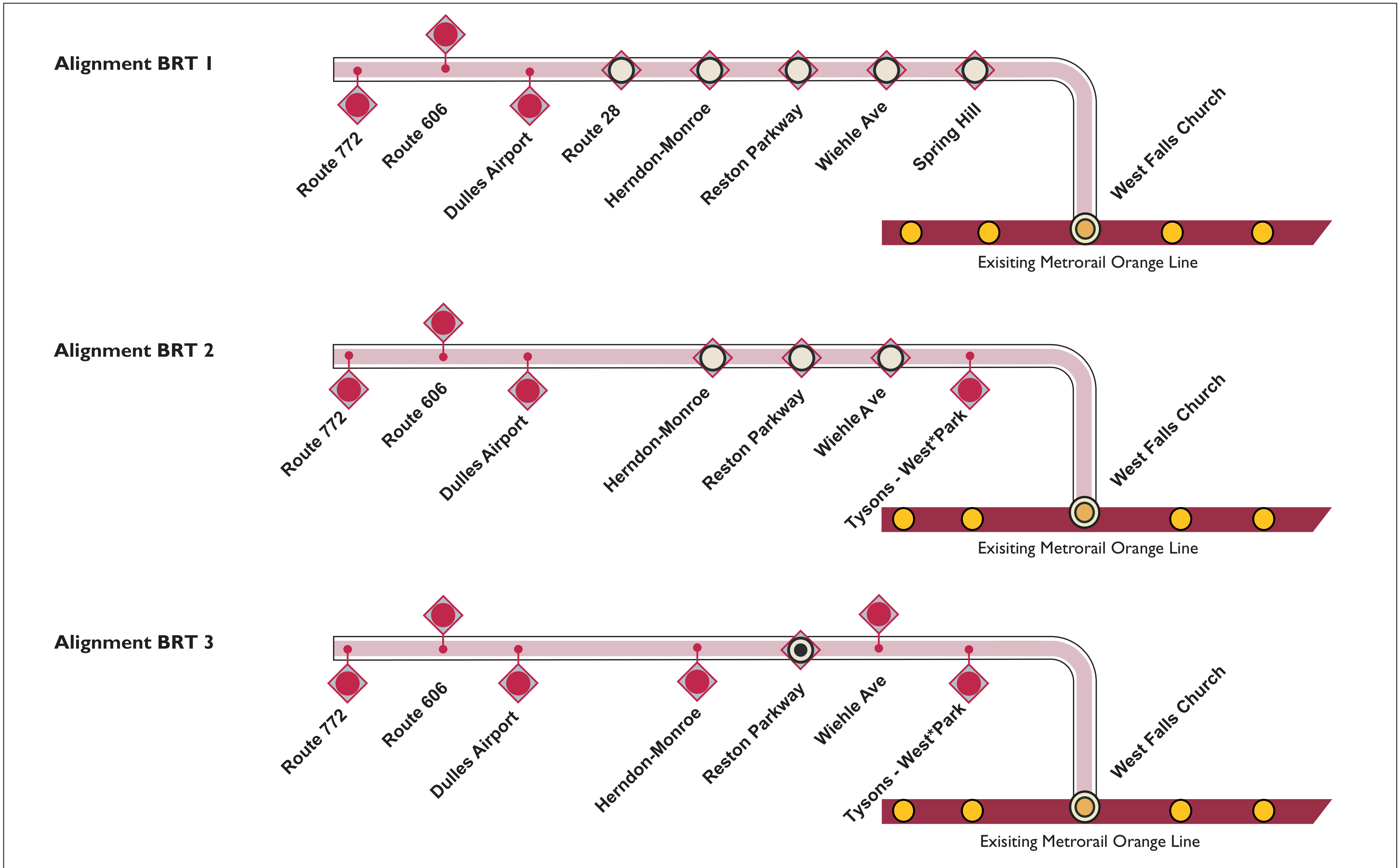
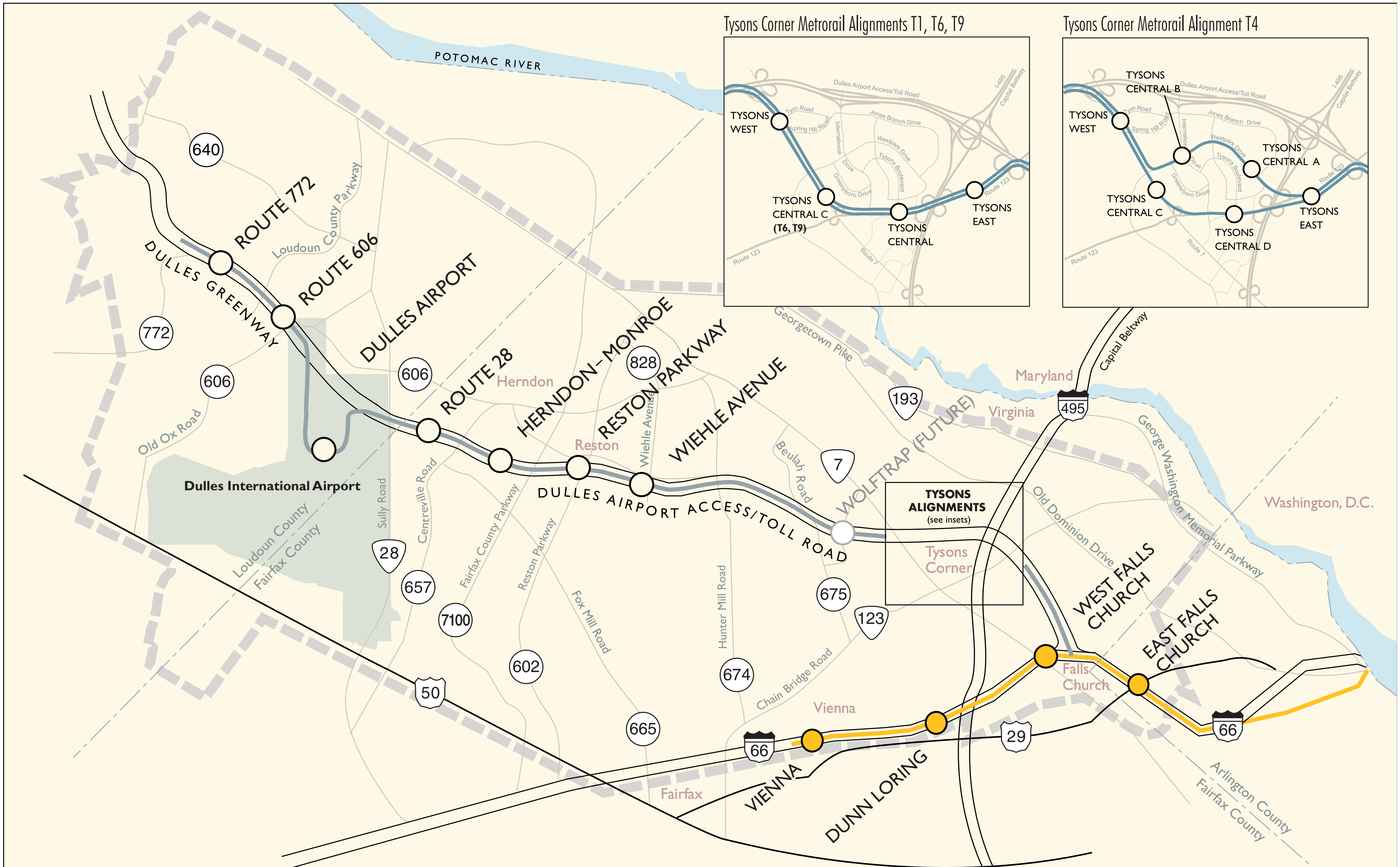



Figure 7.2-2

## BRT Alignment Options




LEGEND

- Existing Metrorail Orange Line and Stations
- Metrorail
- Limited Access Highway
- U.S. Highways
- Major Arterials
- Proposed Transit Station
- Future Station
- Dulles Corridor Boundary

0 1 2 3 MILES

Figure 7.2-3

# Metrorail Alternative

Dulles Corridor Rapid Transit Project

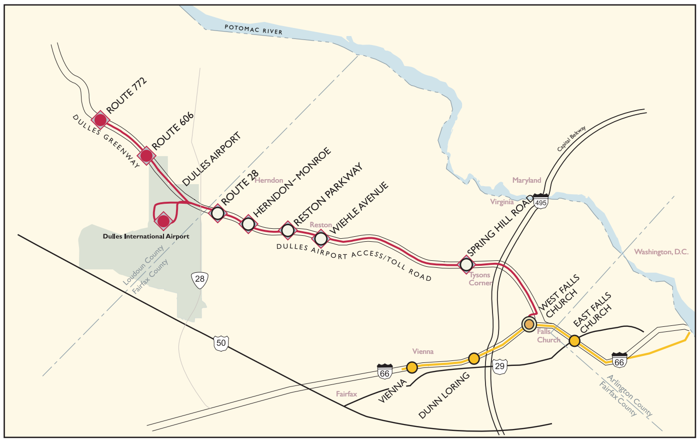

LEGEND
- Proposed Rail Alignment
- Proposed BRT Alignment
- Limited Access Highway
- U.S. Highways
- Major Arterials
- Dulles Corridor Boundary
- Proposed Metrorail Transfer Station
- Existing Metrorail Orange Line and Stations
- Proposed BRT Station
- Proposed BRT Stop
- Proposed Rail Station
- Proposed BRT/Metrorail Transfer Station

0 1 2 3 MILES

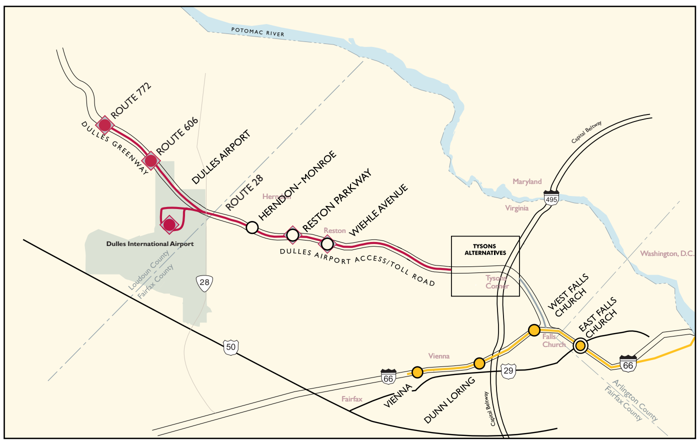
Figure 7.2-4

# BRT/Metrorail Alternative
## (Shown with Alignment BRT1)

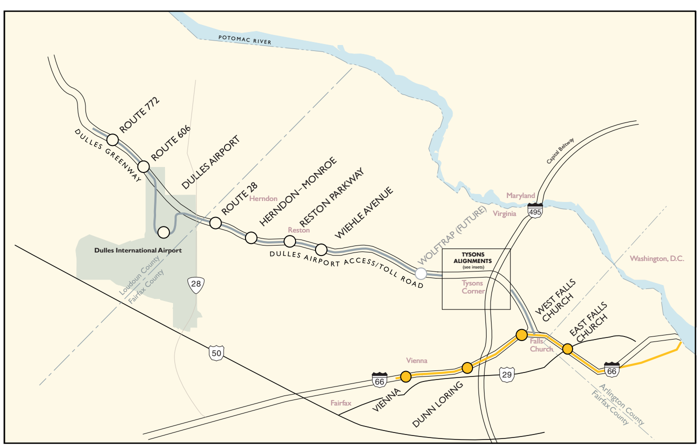
Dulles Corridor
Rapid Transit Project




**BRT Phase (BRT I)**

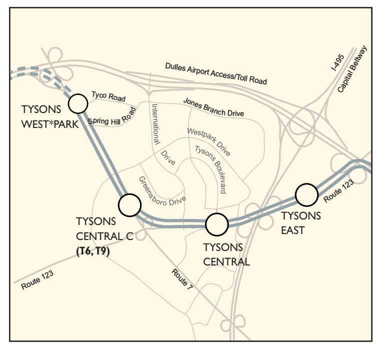



**BRT/Metrorail Phase**



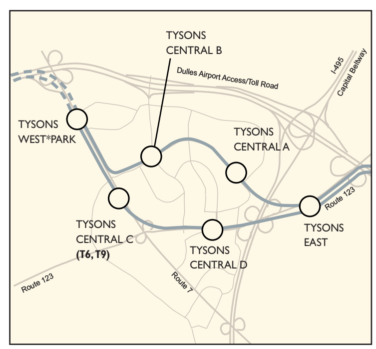

**Metrorail Phase**

## Tysons Metrorail Alignments




Tysons Alignments T1, T6, and T9

BRT or Metrorail




Tysons Alignment T4

BRT or Metrorail

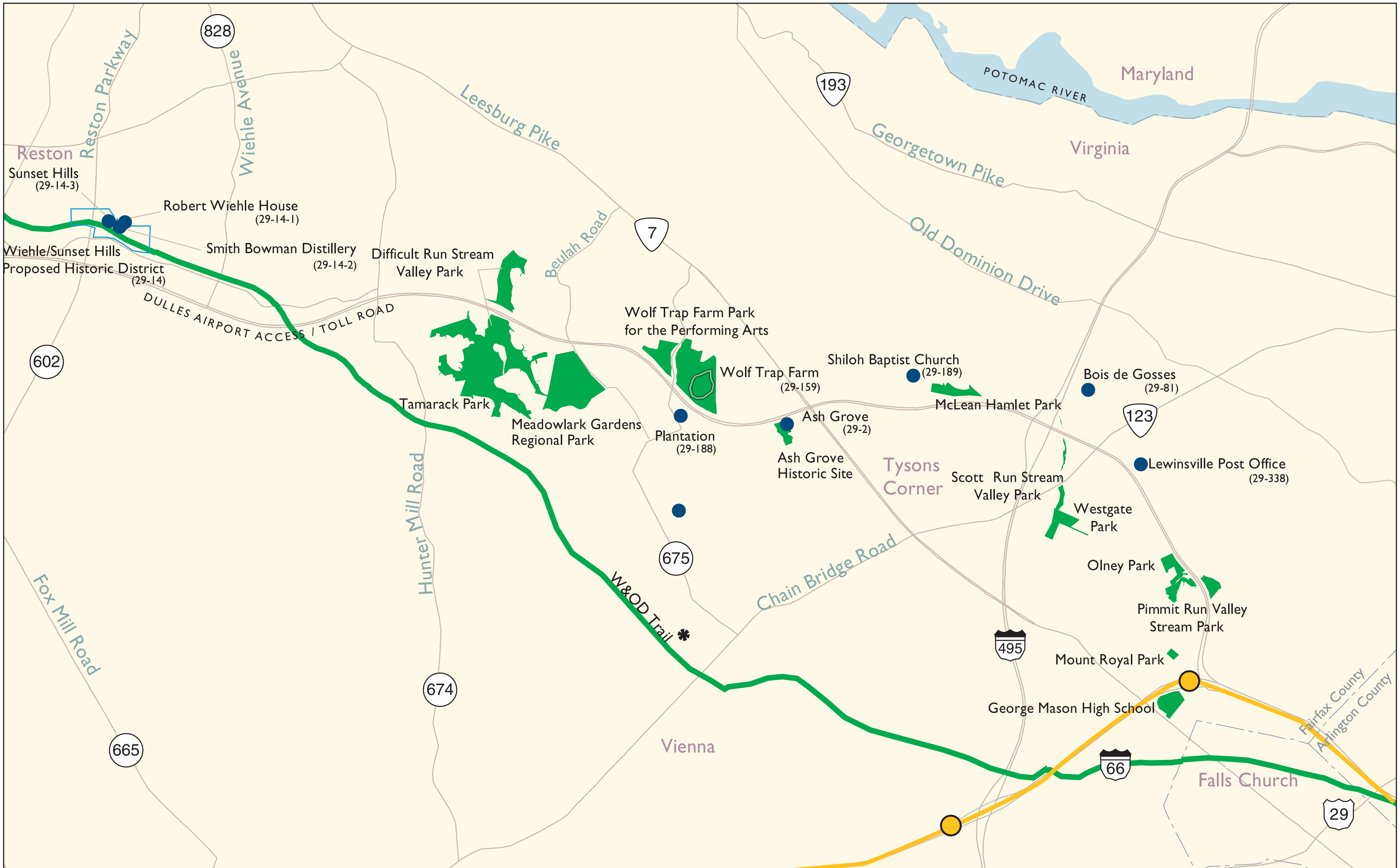
LEGEND

- Proposed Rail Alignment
- Proposed BRT Alignment
- Limited Access Highway
- U.S. Highways
- Major Arterials
- Proposed Metrorail Transfer Station
- Existing Metrorail Orange Line and Stations
- Proposed BRT Station
- Proposed BRT Stop
- Proposed Rail Station
- Proposed BRT/Metrorail Transfer Station

Figure 7.2-5

# Phased Implementation Alternative

Dulles Corridor Rapid Transit Project




LEGEND

- Historic Resources
- Historic District
- Publicly owned Parklands
- ✱ Section 6(f) also applies
- County Boundary
- Existing Orange Line Metrorail and Stations

0 3000 6000 FEET

Figure 7.3-1a

# Potential 4(f)/6(f) Resources

Dulles Corridor
Rapid Transit Project

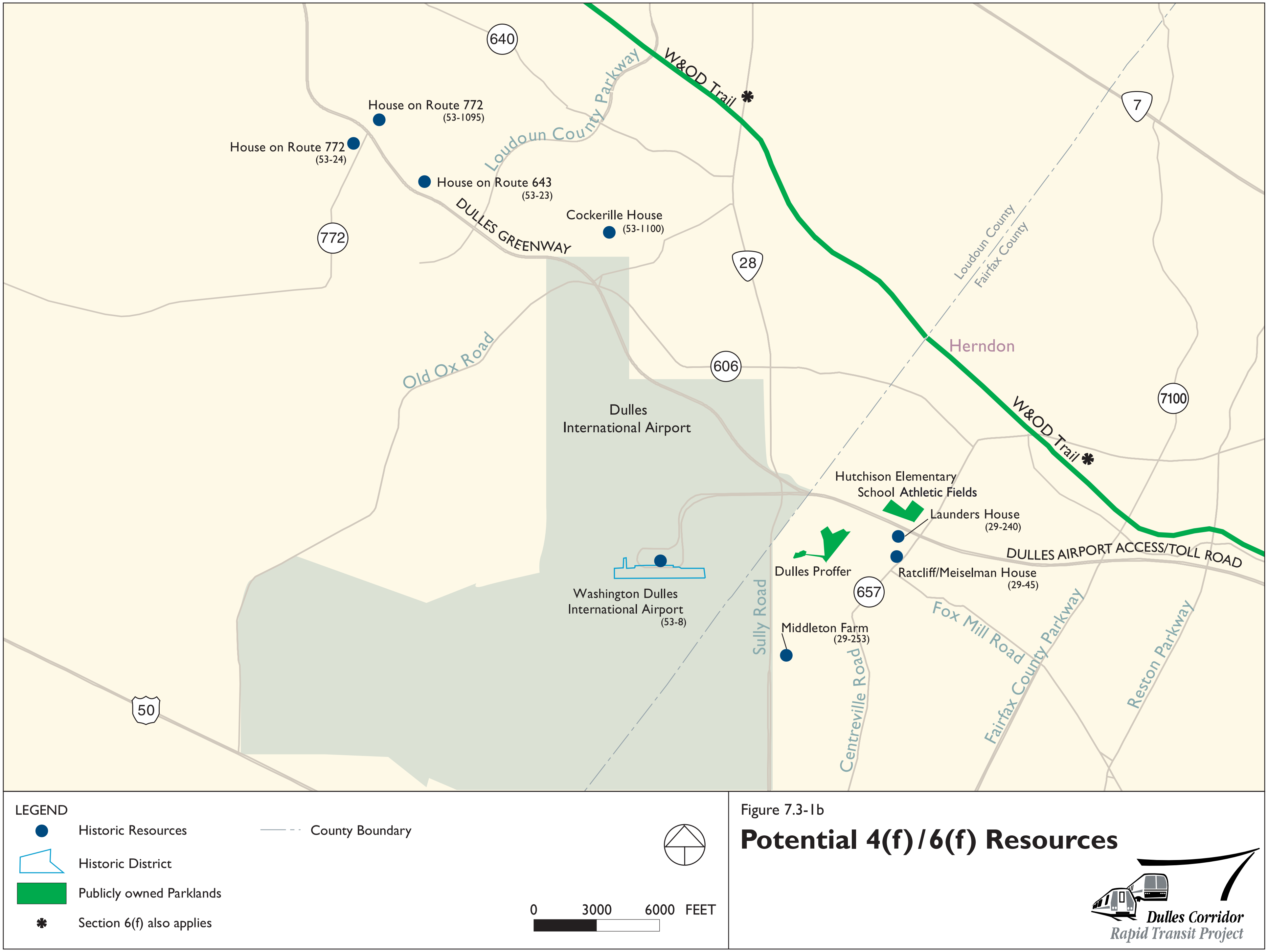



Figure 7.3-1b

# Potential 4(f)/6(f) Resources

Dulles Corridor
Rapid Transit Project

#### 7.3.1.4 Olney Park

Olney Park is approximately 18 acres and is located to the west of the Dulles Connector Road, south of Olney Road, and immediately north of Pimmit Run Stream Valley Park. Olney Park is a neighborhood park with various amenities for recreation activities, including two baseball fields, a basketball court, tennis courts, hiking trail, natural area, open area, picnic area, playground, tot lot, restroom facilities, and a parking lot. A stand of mature trees currently blocks the view of the noise wall adjacent to the Dulles Connector Road. The park is owned and maintained by the FCPA.

#### 7.3.1.5 Westgate Park

Westgate Park is approximately 12 acres in size and is located over 300 feet from the DAAR and Dulles Toll Road, adjacent to Scotts Run Stream Valley Park. It is situated south of Route 123 and Magarity Road, where a portion of the park intersects Scotts Run Stream Valley Park. This park has two baseball fields, two lighted tennis courts, a picnic area, and an open area. The park is owned and operated by the FCPA.

#### 7.3.1.6 Scotts Run Stream Valley Park

Scotts Run Stream Valley Park is a 23-acre linear park that consists of an open recreation area and a hiking trail that follows the course of Scotts Run. A large portion of Scotts Run Stream Valley Park is well north of the Dulles Corridor – west of the Capital Beltway. Approximately 12 acres is within the Dulles Corridor, especially that which is located at Route 123 and Colshire Drive. In addition, the parkland is not continuous along Scotts Run. The trail starts north of the DAAR/Dulles Toll Road, which divides it, then follows the stream as it flows to the south side of Route 123 and east of Old Meadow Road where most of the parkland is located. The portion of the trail near the DAAR/Dulles Toll Road is not a well-maintained trail and appears to have very little use. This park is owned and maintained by the FCPA.

#### 7.3.1.7 McLean Hamlet Park

McLean Hamlet Park covers approximately 17 acres size and is located north of the DAAR/Dulles Toll Road on the east side of International Drive. It is an undeveloped park that consists of a natural area and an open area. Noise and visual effects of the DAAR are currently buffered along the southern portion of the park by a noise wall. The FCPA owns this facility.

#### 7.3.1.8 Ash Grove Historic Site

Ash Grove Historic Site, approximately 12 acres in size, is located at the southwest intersection of Route 7 and the DAAR/Dulles Toll Road. The developer of Tysons Village townhouses dedicated the Ash Grove Historic Site to the FCPA. This site currently includes a historic house, a detached brick kitchen and a wood-framed smokehouse. A stand of mature trees and a wall currently buffer the view of the DAAR/Dulles Toll Road.

#### 7.3.1.9 Wolf Trap Farm Park for the Performing Arts

Wolf Trap Farm Park for the Performing Arts, approximately 130 acres in size, is located near the DAAR/Dulles Toll Road at Trap Road. This park, which is owned by the National Park Service (NPS), includes an open-air performing pavilion, restaurant pavilion, and indoor theater. The Wolf Trap Foundation, a non-profit organization, in cooperation with the NPS, produces performances at the park.

#### 7.3.1.10 Meadowlark Gardens Regional Park

Meadowlark Gardens Regional Park is approximately 95 acres in size and is located south of the DAAR/Dulles Toll Road on Meadowlark Gardens Court. The park has both active and passive uses, gardens, meeting and

reception rooms, a gift shop, gazebos, and nature trails. The park is buffered from the DAAR/Dulles Toll Road by a wall and trees. It is owned by the Northern Virginia Regional Park Authority (NVRPA).

#### 7.3.1.11 Difficult Run Stream Valley Park

Difficult Run Stream Valley Park is a linear park that is a total of approximately 863 acres. Approximately 0.10 acres of the park is located near the DAAR/Dulles Toll Road. The park, owned and operated by the FCPA, is located on either side of the DAAR/Dulles Toll Road, and comprises a hiking and equestrian trail that extends into the Wolf Trap Meadow Subdivision. The trail crosses under the DAAR/Dulles Toll Road approximately a mile west of Route 674 (Beulah Road), but this trail segment is not parkland. The Park Authority does not own the land under the highway bridges. The view of the DAAR and Dulles Toll Road in the park itself is buffered from the north by a wall and from the south by a partial wall.

#### 7.3.1.12 Tamarack Park

Tamarack Park, approximately 20 acres in size, is a neighborhood park located in Vienna. Located south of the DAAR/Dulles Toll Road and adjacent to Difficult Run Stream Valley Park, it serves the local community with a bike trail, equestrian trail, nature trail, natural area, and an open area. This park is owned and operated by the FCPA.

#### 7.3.1.13 Washington & Old Dominion (W&OD) Railroad Regional Park

The W&OD Railroad Regional Park is a 45-mile-long and 100-foot-wide recreational trail that runs between Arlington County and Loudoun County. This paved trail is used for walking, running, and bicycling and is commonly known as the W&OD Trail. It also includes a 32-mile adjacent gravel trail for horseback riding from Vienna to Purcellville. The trail crosses the DAAR/Dulles Toll Road approximately one-half mile east of Wiehle Avenue. Planned improvements include additional parking, trail widening and restorations, interpretive displays, and drinking fountains. This trail is owned and maintained by the NVRPA. The W&OD Railroad Regional Park is also protected under Section 6(f) of the Land and Water Conservation Fund Act. In the 1960s, the federal government acquired an easement across the W&OD Railroad (prior to its conversion to parkland) for the Dulles Toll Road overpass.

#### 7.3.1.14 Hutchison Elementary School Athletic Fields

Hutchison Elementary School has athletic fields that border the DAAR/Dulles Toll Road and are located southwest of Parker Avenue in Herndon. Through an agreement with the Fairfax County Public School District, the FCPA uses the athletic fields—two baseball diamonds and six football fields—for organized activities after the normal hours of operation.

#### 7.3.1.15 Land Proffered to Fairfax County Park Authority (Dulles Proffer)

A parcel comprising approximately 60 acres of land located east of Route 28 (Sully Road), south of the DAAR was proffered to the FCPA in anticipation that it would become a publicly owned park in the future. Transfer of ownership of this parcel is not yet complete and is dependent upon rezoning and development approvals.

### 7.3.2 ARCHAEOLOGICAL AND HISTORIC RESOURCES

For the purposes of Section 4(f), a historic or archaeological site is considered significant if it is listed or eligible for listing on the National Register or if it is of national, state, or local significance. Section 4(f) applies to archaeological sites that are on or eligible for inclusion on the National Register and warrant preservation in place.

The following sections discuss the archeological and historic resources evaluated under the provisions of Section 4(f).

#### 7.3.2.1 Archaeological Resources

The locations of archaeological resources are kept confidential to protect the sites from disturbance and looting and are not provided in this report. The 20 archaeological resources evaluated under the provision of Section 4(f) are described below.

**Site 44FX0388 (Olney Park/Dulles Access Connector Site).** This undated prehistoric site probably functioned as a rock quarry. The site was located in the right-of-way for the Dulles Connector Road when it was discovered in 1981.

**Site 44FX2024 (Magarity Site).** This historic site dates to the mid-nineteenth to mid-twentieth centuries. It was identified in 1993 in a clearing on high ground where historic map research suggested a farm dwelling once stood. The occupants shown on the nineteenth-century maps of the site area were the Magarity family. Further testing in the clearing and surrounding woods was recommended in 1993. This site is on land was graded and developed commercially in 2001, and likely has been destroyed.

**Site 44FX0051 (Maplewood).** This historic site is associated with the Maplewood historic house that once stood at this location. Maplewood was built in 1870 and was demolished in 1970. After demolition of Maplewood, the area was presumably graded prior to construction of the present office building. Current plans call for the area to be redeveloped for commercial purposes. It does not appear that any archaeological investigation has been conducted at the site.

**Site 44FX2299 (Jarrett #4).** This prehistoric site consists of a camp of unknown date. Phase II (subsurface) testing was recommended by WAPORA, Inc. before development. Most of the site was probably destroyed by construction of the Dulles Toll Road.

**Site 44FX1569 (Dulles Toll Road Site).** This prehistoric site may have functioned as a stone quarry. The site was surveyed by Fairfax County personnel in 1989 and underwent Phase II testing that same year. The site was thought to be potentially eligible for the National Register, and Phase III excavations were recommended prior to construction. No record of Phase II excavations was found by the project team.

**Site 44FX2043 (Reston Land Parcel 912 A&B).** This historic site dates to the twentieth and possibly late nineteenth centuries. The site consisted of foundations from a complex of farm buildings that were destroyed in the 1980s. The Launders/Arrowhead Farm was abandoned and the area was slated for development in 1993, but no development has occurred to date. No further work at the site was recommended.

**Site 44FX1489 (Worldgate Hotel Site).** This prehistoric and historic site was discovered in 1988. Phase II testing was conducted that same year. Artifacts recovered date to a variety of time periods, including 7000 BC, 3000 BC, 2000 BC, and the late nineteenth century. Most of the site was apparently destroyed by development.

**Site 44FX0232.** This is a prehistoric site of unknown date discovered in 1980. By 1994, a man-made lake occupied part of the site, leading to the conclusion that at least part of the site was destroyed.

**Site 44FX0915 (Arrowhead Farm).** This is a historic site dating from the twentieth century. In 1985, a surface scatter of artifacts was found which were thought to be associated with the standing house on the

property. However, the assemblage may have been debris thrown into the area from Horsepen Road and, therefore, of indefinite association.

**Site 44FX2233 (Dulles Green/DG 2).** This is a historic site dating to the late nineteenth century or start of the twentieth century. A domestic complex is depicted at this location on historic maps. The site was rediscovered during a walkover Phase I survey in 1997. At that time, the site was an abandoned overgrown field slated for development. Surface deposits were present, but no subsurface integrity was found. The location does not appear to have been developed.

**Site 44LD0500 (Trueno).** This is a prehistoric site from the Archaic Period discovered in an open field in 1991. The site was on level ground that had been graded and contoured. Some artifacts were recovered during the previous investigation. No further work was recommended for the site, which has since been developed as part of the rental car facilities associated with Dulles Airport.

**Site 44LD0491 (HE-696A "Orange").** This prehistoric site was discovered in a cleared field south of a commercial plant in 1991. It may have been disturbed by construction of the Dulles Greenway and/or land contouring/stormwater control for a nearby industrial park.

**Site 44LD0379 (HNWE-1A or Indian Creek Site).** This is a prehistoric site dating to the Early (approximately 7500 – 5000 BC) and possibly Middle Archaic (5000 – 3000 BC) Periods. The site was identified in 1987. Some artifacts were recovered during an earlier investigation and further testing was recommended. The site is within the 100-year floodplain for Indian Creek. Phase II testing was conducted in 1988. The site was found to contain intact features including post molds and areas of burned and compacted soil (possible hearths). Phase III excavation was recommended. The site may have been at least partially destroyed by construction of the Dulles Greenway in the mid-1990s, although some of the site may have been avoided during construction of the bridge crossing the creek.

**Site 44LD0405 (HSE-606A).** This prehistoric site was identified in 1988 in an area covered with young deciduous trees. The site initially appeared to date to the Late Archaic Period (2500-1500 BC) based on the finding of a Savannah River type projectile point. Further archaeological work was recommended since the site lay in the right-of-way for one alignment for the Dulles Greenway (Hayes 1988). Phase II archaeological testing was conducted later in 1988, revealing a high concentration of lithic artifacts and diagnostic material spanning the Early Archaic to Late Woodland periods (7500 BC to 1600 AD; Haynes 1990). Archaeological features were identified, including chipping clusters and concentrations of fire-cracked rock. Mitigation of adverse effects by excavation of approximately 20 percent of the site was recommended. However, the alignment chosen for the Dulles Greenway did not include this site location. This site is not listed in the NHRP, but is eligible.

**Site 44LD0380 (HNWF-1A).** This is a site with both prehistoric (date unknown) and historic (early twentieth century) components. The site was discovered in a pine plantation in 1987. Some artifacts were recovered but moderate to heavy disturbance by construction of logging roads was noted. No further work was recommended because the area of the site to be impacted was sparse and disturbed. The site probably was further disturbed by the construction of a Dulles Greenway interchange.

**Site 44LD0408 (HSP-789A).** This prehistoric site of unknown date was identified in a cultivated field in 1988. Some artifacts were recovered during the previous investigation and further survey and testing were recommended. Phase II testing was conducted in 1988. The site was judged not to contain data sources of

significant value and no further work was recommended. The site is currently used as pastureland on an active farm (2001).

**Site 44LD0383 (HSEE-BR).** This is a prehistoric site of unknown date discovered in 1987. The surface was covered in brush in a formerly cultivated field on a floodplain. Some artifacts were recovered during the previous investigation and further testing was recommended. Phase II testing was conducted in 1988. The site was judged not to contain data sources of significant value and no further work was recommended. The site may have been destroyed by construction of the Dulles Greenway.

**Site 44LD0472 (HE-P620A).** This is a prehistoric site of unknown date discovered in 1990. Phase II testing was recommended by WAPORA, Inc. The site may have been at least partially disturbed by construction of the Dulles Greenway.

**Site 44LD0377 (HNWB-1A).** This is a prehistoric site of unknown date discovered on a sod farm in 1987. Some artifacts were recovered but no further work was recommended because the site was so sparse. The site appears to be within a tract currently undergoing development.

**Site 44LD0378 (HNWB-1B).** This is a site with both prehistoric (undated) and historic (nineteenth century) components. No further work was recommended because the site was sparse for its size. The site was probably destroyed during construction of the Dulles Greenway.

#### 7.3.2.2 Historic Architectural Resources

A total of 18 historic resources were evaluated under the provisions of Section 4(f). They are described in more detail below.

**Lewinsville Post Office (29-338), 1554 Great Falls Road, McLean.** This building contains a two-story, front-gabled, wood frame structure with a one-story front porch. Constructed in the 1850s, it served as the Lewinsville Post Office from 1857 to 1911. The post office and general store occupied the large room on the first floor. In 1980, the building was moved several hundred feet for the widening of Route 123. The building's interior and exterior retain a high degree of historical integrity. The resource was placed on the Fairfax County Historic Landmarks Inventory in 1981. The State Review Board found that the building was not eligible for the National Register or Virginia Landmarks Register in 1986, but could be reconsidered if more evidence of eligibility is provided.

**Bois de Gosses (29-81), 1358 Windy Hill Road, McLean.** This two-story dwelling consists of a series of additions built around an original four-room, hewn log core. The log portion of the house was possibly built as early as 1800. The house was expanded before 1869 and again in 1954. It now has a full-length, two-story front porch and exterior brick end chimneys. The dwelling reportedly served as a field hospital during the Civil War. Historically, it was also known as Windy Hill Farm and Hill Farm. The property was entered on the Fairfax County Historic Landmarks Inventory in 1971.

**Shiloh Baptist Church (29-189), 1331 Spring Hill Road, McLean.** This one-story, wood-frame church features the simple, elongated nave plan typical of the late nineteenth- and early twentieth- century rural churches. Each side elevation has four Gothic arch, stained glass windows. Although the congregation was formed in 1873, this building was erected in the 1920s after the original church burned. With the Pleasant Grove Methodist Church, Shiloh Baptist Church is one of two churches serving Odricks, a community formed

in the 1870s by African Americans. The property was entered on the Fairfax County Historic Landmarks Inventory in 1972.

**Ash Grove (29-2), 8900 Ash Grove Lane, Vienna.** The Ash Grove historic site consists of a rebuilt eighteenth-century dwelling with two historic outbuildings. The two-and-one-half-story clapboard house features three gabled dormers, brick interior end chimneys, and a rear ell (annex). The Fairfax family reportedly built its original core as early as 1790. In 1850, Captain Henry Fairfax sold the property to James Sherman and it remained in the Sherman family through five generations. To preserve the house, the DAAR was rerouted. In 1960, the house was documented in accordance with The Historic American Buildings Survey (HABS) with measured drawings and photographs. During a subsequent restoration effort, most of the main house burned in September 1960. Original doors, windows, and interior woodwork, which had been removed for restoration, were reused when the house was rebuilt with the guidance of the HABS drawings and photographs. Within the past decade, a developer purchased the property for the construction of the Tysons Village townhouse complex. As part of the development, the FCPA acquired the 12 acres of the site containing the house, the detached brick kitchen, the wood-frame smokehouse, and the Sherman and Fairfax family cemetery.

**Wolf Trap Farm (29-159), 1551 and 1555 Trap Road, Vienna.** Presently owned by the NPS, Wolf Trap Farm Park for the Performing Arts is a 130-acre complex that consists of a historic farm that was developed into the country's first national park for the performing arts in the mid-twentieth century. The resources on this property include the original Wolf Trap Farm, the Filene Center auditorium, and its associated outbuildings. The historic farmhouse on the property is a one-and-one-half-story dwelling with a hewn-log core and lean-to that possibly date to the eighteenth century. The house was expanded in the nineteenth and twentieth centuries with one- and two-story additions on the north side, a dormer on the east slope of the original cabin roof, and a kitchen on the south side. The farm property is reportedly associated with local events during the Civil War. Prominent Washingtonians Jouett and Catherine Filene Shouse used the farm in the 1930s and 1940s as a country retreat. In 1944, the United Kingdom delegation gathered at the site for preliminary talks preceding the Dumbarton Oaks Conference on International Organization, which led to the creation of the United Nations. The Shouses donated the farm to NPS in 1966 to create the Filene Center for the Performing Arts. In 1972, the property was entered on the Fairfax County Historic Landmarks Inventory. Efforts have been made to create a cultural district around the property to control adjacent development. NPS completed a National Register Inventory Nomination Form for the historic farmhouse in 1974, but the property was not formally listed on the National Register.

**Plantation (29-188), 1624 Trap Road, Vienna.** This is a two-story brick and frame dwelling with extensive alterations and numerous outbuildings. It was built around 1895 as a vernacular cross-gabled dwelling. Part of the Wolf Trap Farm parcel, the property was renovated in the 1960s by Catherine Filene Shouse, the donor of Wolf Trap Farm Park and the Filene Center for the Performing Arts. It was listed on the Fairfax County Historic Landmarks Inventory in 1971. The property is now used as offices for Wolf Trap Farm Park and includes a variety of historic and modern buildings. These include frame sheds, a barn, and stables, as well as a greenhouse, two prefabricated mobile homes, and a modern log cabin. Near the complex are two eighteenth- century barns that were moved from out-of-state locations and rebuilt on the site. Known as The Barns of Wolf Trap, these buildings are used for informal performances.

**Robert Wiehle House (29-14-1), 1830 Old Reston Avenue, Reston.** This two-story frame dwelling has a center gable and a one-story front porch. Built circa 1890, it retains much of its original ornamental Carpenter Gothic woodwork. It was built for Robert Wiehle and is one of only three buildings that remain of the town of Wiehle, Virginia. In the 1880s, Wiehle's uncle, Dr. Carl Adolph "Max" Wiehle, purchased a large

tract of land here and planned a self-sufficient town. The building now sits in the midst of modern Reston, which was developed in the 1950s and 1960s. A partial Preliminary Information Form (PIF), a form that is sometimes filled out before a National Register Nomination Form is completed, was submitted to the Virginia Division of Historic Landmarks in 1992 for preliminary consideration of the house for the Virginia Landmarks Register and the National Register, but the property has not been listed on these registers.

**Smith Bowman Distillery (29-14-2), 1875 Old Reston Avenue, Reston.** This simple two-story, front-gabled, brick building was built in 1892 as the town hall for Wiehle. The Wiehle Methodist Episcopal Church used its second floor for church services. The building was also the social center for the town founded by Dr. Max Wiehle. The community failed to grow, however, and after Wiehle's death, Dr. Hutchison bought much of the land, and the old town hall was converted into a residence. The building was later incorporated into the 7,200-acre Sunset Hills Farm, owned by A. Smith Bowman. In 1934, Bowman established Virginia's only legal whiskey distillery on the farm. The old town hall was altered to accommodate distilling vats and stills for the production of Virginia Gentleman and Fairfax County brands of whiskey. It is now the only building remaining from the factory, currently in the midst of modern Reston. In 1999, the building was listed in the National Register and the Virginia Historic Landmarks Register as a significant architectural example of an early town hall, and because of its association with locally significant persons and historical events.

**Sunset Hills (29-14-3), 1850 Reston Avenue, Reston.** Sunset Hills is a symmetrical two-and-one-half-story brick dwelling dominated by a central porte-cochere. Washington, D.C. architect Erskin Sunderland designed the house, which was built in 1899 and originally named the Wiehle Mansion for its first owner, Dr. Max Wiehle. By the 1920s it was occupied by A. Smith Bowman. The Historic Preservation Planner of Fairfax County completed the National Register Inventory Nomination Form for the property in 1978, but the Virginia Historic Landmarks Commission concluded that the dwelling was not eligible for listing. However, eligibility standards have been revised since 1978 and now this resource probably is eligible. The building is now called the DeMoss House and is part of a complex owned by the Prison Fellowship Ministries in the midst of modern Reston.

**Wiehle/Sunset Hills Proposed Historic District (29-14), Reston.** In 1987, the Fairfax County Historic Preservation Officer submitted a PIF to the Virginia Division of Historic Landmarks for preliminary consideration of this historic district for listing on the Virginia Landmarks Register and the National Register. The 16-acre district was to include the Robert Wiehle House, Sunset Hills, and the Smith Bowman Distillery. Included in the boundaries, but not mentioned in the documentation, is the Sunset Hills Railroad Station of the Washington and Old Dominion Railroad, a small, wood-frame building built as a passenger station between 1912 and 1915 and currently owned by the NVRPA. There have also been efforts to designate Route 5734 (Sunset Hills Road) as a scenic byway, but the Virginia Department of Historic Resources concluded that the route did not qualify.

**Launders House (29-240), 2300 Centreville Road, Herndon.** This is a two-story frame dwelling, built around 1910 near the community of Floris. It is clad in weatherboard siding and sits on a concrete foundation. It is typical to the I-house plan, three bays wide with a side-gable roof. It also features a two-story full-front porch. It was surveyed as part of the Fairfax County Historic Resources Management Plan (HRMP) in 1985.

**Ratcliff/Meiselman House (29-245), 2346 Centerville Road, Herndon.** This farm complex, near the Floris community, is significant for its association with the Civil War. Laura Ratcliff, the wartime occupant of the property, was a close friend of Confederate Colonel John Singleton Mosby. Mosby gained local prominence during the Civil War for harassing Union troops traversing the region throughout the conflict.

The house figured prominently in Mosby's wartime activities and he is said to have received his officer's commission in its living room. Additionally, the wood-frame house has architectural significance, with an original core dating to the late eighteenth century. The property is listed on the Fairfax County Historic Landmarks Inventory and it was surveyed as part of the Fairfax County HRMP in 1985. Although no determination has been made about its eligibility for the National Register or the Virginia Landmarks Register, the HRMP recommended that the property be evaluated for possible individual listing on the National Register.

**Middleton Farm (29-253), 13801 Frying Pan Road, Herndon.** This extensive dairy farm complex includes 23 buildings and four structures and has been cited as an excellent example of a surviving dairy farm in Fairfax County. The two-story brick farmhouse, built in 1912, has elements of a typical American Foursquare dwelling including a large one-story front porch and cast-concrete sills and lintels that would have been considered modern materials at the time. The property also includes a frame dwelling that could date to the 1850s. Other buildings and structures on the property include two dairy barn complexes, numerous sheds, a silo, and a well house. The farm was surveyed in 1985 as part of the HRMP, which described the farm as the most important example of the agricultural and dairying history of the county and identified the oldest barn as one of only two late-nineteenth-century barns remaining in the western part of the county. The 1928 dairy barn was also cited as an excellent remaining example of its type. The 1912 dwelling was described as "perhaps the most intact house of that era in all of Fairfax County." Although no determination has been made about its eligibility for the National Register or the Virginia Landmarks Register, the HRMP recommended that the property be evaluated for possible individual listing on the National Register.

**Washington Dulles International Airport (53-8).** Opened on November 19, 1962, Dulles Airport encompasses approximately 11,000 acres of land in Fairfax and Loudoun counties and was the first airport in the world designed exclusively for jet travel. Renowned Finnish-born American architect Eero Saarinen stated that he considered the concrete, steel, and glass Main Terminal, which dominates the property, as his finest achievement. In the 1970s, the Advisory Council on Historic Preservation, the Virginia Historic Landmarks Commission, and the American Institute of Architects registered concerns about proposed alterations to this significant property. In 1977, the Keeper of the National Register asked the U.S. Department of Transportation (U.S. DOT) to nominate the property to the National Register. U.S. DOT then requested a determination of eligibility from the National Register, which was made in 1978. Although the property was determined to be eligible under Criteria A, B, and C, it was never formally listed.

A 1989 historic architectural survey of the property identified 13 of the 62 buildings at the airport as contributing buildings in an historic district associated with the Main Terminal. The proposed district encompasses the integral parts of Saarinen's original intent. Contributing buildings include the Main Terminal and control tower, a group of four maintenance and support facility buildings to the west of the terminal, the group of four service buildings east of the terminal, and two apron buildings, specifically the Apron Tower and the Triturator Building. The 18 original mobile lounges were identified as historic structures. Terminal area landscaping and the approach road were identified as contributing landscape elements associated with the main terminal.

Modifications to the airport have taken place over the years. Passenger waiting areas were added on the south side of the Main Terminal in the 1970s. Temporary aircraft boarding-gate facilities were added at the base of the Tower in the mid-1980s, as well as temporary midfield buildings at the remote jet apron. A new Master Plan for Dulles Airport was completed in 1985. Proposed changes included a midfield concourse linked to the Main Terminal by an underground people-mover system and the expansion of the Main Terminal to 1,240

feet. The expansion to the Main Terminal is now complete. The Master Plan was updated in 1986, adding a proposed International Arrivals Building in the midfield area.

**Cockerille House (53-1100), Route 789, Sterling Vicinity.** This two-story, wood frame farmhouse was probably built in the early twentieth century. It is an example of a hall-and-parlor plan farmhouse and has a side gable, standing-seam, metal roof. It has been expanded with several one-story additions. Its outbuildings include three wood frame and concrete block barns and nine other miscellaneous farm buildings.

**House, Route 643 (53-23), Ryan.** This two-story, wood-frame farmhouse with a side-gable, standing seam, metal roof is an example of a typical I-house and probably dates to the late nineteenth century. It has been covered with stucco and has a shed-roofed front porch. The property also includes several small, concrete-block sheds, barns, and a silo. The dwelling was surveyed in 1988. It is presently abandoned and deteriorating.

**House, Route 772 (now Petworth Court) (53-1095), Ryan.** This two-story, wood-frame dwelling is two bays wide and exhibits the common vernacular hall-and-parlor plan with a rear extension. It was probably built in the early twentieth century. The shed-roofed front porch has been recently enclosed. The property also includes a shed.

**House, Route 772 (53-24), Ryan.** This two-story, wood frame dwelling exhibits the common vernacular hall-and-parlor plan. It was probably built in the late nineteenth or early twentieth century. It features a shed-roofed front porch. The property also includes a modern garage. The dwelling was surveyed in 1988. The house was described as being a very common type and found that further documentation was not necessary.

## 7.4 POTENTIAL EFFECTS

The potential effects of the project on lands and properties protected under Section 4(f) and Section 6(f) are discussed below for the Baseline, BRT, Metrorail, BRT/Metrorail, and Phased Implementation Alternatives.

### 7.4.1 BASELINE ALTERNATIVE

No use of Section 4(f) or 6(f) resources attributable to the Dulles Corridor Rapid Transit Project would occur from the Baseline Alternative.

### 7.4.2 BRT ALTERNATIVE

The BRT Alternative would generally use existing roadway travel lanes. Major construction would consist of new BRT stations, stops, ramps, layover and welfare facilities, and a BRT Maintenance and Storage Facility. Three alignment options exist for the BRT Alternative; Alignments BRT 1, BRT 2, and BRT 3.

Alignment BRT 1 would include new access ramps from the Dulles Connector Road and layover and welfare facilities at the West Falls Church Station; center-median stations at Spring Hill Road, Wiehle Avenue, Reston Parkway, Herndon-Monroe, and Route 28; a fare collection area inside Dulles Airport, and a BRT vehicle Maintenance and Storage Facility in Loudoun County. Minor improvements, such as reconfiguration of the existing busbays at West Falls Church and the addition of BRT stops at Tysons-West*Park Transit Station, Dulles Airport, Route 606, and Route 772, would also occur. Alignment BRT 2 would include median stations at Wiehle Avenue, Reston Parkway, and Herndon-Monroe, with stops at Tysons-West*Park Transit Station, Dulles Airport, Route 606, and Route 772. Alignment BRT 3 would have one station, a bi-level

median station at Reston Parkway, and stops at Tysons-West*Park Transit Station, Wiehle Avenue, Herndon-Monroe, Dulles Airport, Route 606, and Route 772.

A new BRT Maintenance and Storage Facility is proposed for Site 14, the area on the east side of the Dulles Greenway, south of the Dulles North Transit Center in Loudoun County. The BRT Alternative would not require any permanent or temporary use of Section 4(f) or 6(f) resources. The effects to Section 4(f) resources would be the same for each of the three BRT alignments.

Proximity impacts to Section 4(f) resources from the BRT Alternative, such as noise, vibration, air quality, or visual impacts, would be minimal and would not substantially impair the use of any Section 4(f) resource. Further discussion of selected resources follows. No impacts to Section 6f) resources would occur.

#### 7.4.2.1 McLean Hamlet Park

The BRT Alternative would be located in the vicinity of this 4(f) resource. No impacts would occur at this site as a result of the BRT Alternative.

#### 7.4.2.2 Ash Grove Historic Site

The BRT Alternative would be located in the vicinity of this 4(f) resource. No impacts would occur at this site as a result of the BRT Alternative.

#### 7.4.2.3 Wolf Trap Farm Park for the Performing Arts

The BRT Alternative would be located in the vicinity of this 4(f) resource. No impacts would occur at this site as a result of the BRT Alternative.

#### 7.4.2.4 Meadowlark Gardens Regional Park

The BRT Alternative would be located in the vicinity of this 4(f) resource. No impacts would occur at this site as a result of the BRT Alternative.

#### 7.4.2.5 Difficult Run Stream Valley Park

The BRT Alternative would be located in the vicinity of this 4(f) resource. No impacts would occur at this site as a result of the BRT Alternative.

#### 7.4.2.6 Tamarack Park

The BRT Alternative would be located in the vicinity of this 4(f) resource. No impacts would occur at this site as a result of the BRT Alternative.

#### 7.4.2.7 Dulles Proffer

The BRT Alternative would be located in the vicinity of this 4(f) resource. No impacts would occur at this site as a result of the BRT Alternative.

#### 7.4.2.8 Wiehle/Sunset Hills Proposed Historic District (29-14)

BRT operations in the median of the DAAR would exceed the FTA Noise Impact Criteria for this Category 2 historic district. For Alignments BRT 1 and BRT 2, the projected noise level is 63 dBA, and for Alignment BRT 3 the noise level would be 64 dBA. The existing background noise level in the historic district is 61 dBA and the FTA severe impact criterion is 64 dBA. Predicted noise levels at the historic resources still standing within the proposed historic district (the Robert Wiehle House, the Smith Bowman Distillery, and Sunset Hills)

do not exceed the FTA impact criterion, and are estimated to range between 47 and 49 dBA. The portion of the proposed historic district that is closest to the study area (the south eastern region) was used for noise modeling purposes but no longer contains historic structures. Thus the impacts associated with the BRT alignment options would be minimal and would not result in an impairment of the use of this resource.

#### 7.4.2.9 Hutchison Elementary School Athletic Fields

The BRT Alternative would be located in the vicinity of this resource. No impacts would occur at this site.

#### 7.4.2.10 Washington Dulles International Airport (53-8)

All three alignment options for the BRT Alternative would place a new BRT stop at Dulles Airport. This facility would include bus bays along the curb on the ground transportation road in front of the east end of the terminal, with the fare collection area located inside the ground transportation level of the terminal.

The BRT stop facilities would not result in direct use or proximity impacts to the structures that have been determined eligible for the National Register. Because the proposed improvements are located within a transportation area (roads and parking lots), noise and vibration impacts greater than the existing conditions would be minimal. All of the improvements associated with the Dulles Airport BRT Stop are designed in context with the surrounding environment and are of such a small scale that they would have minimal visual impact. The minimal proximity impacts at this location would not reduce the significance of the historic resource.

#### 7.4.2.11 House, Route 772 (53-24)

Alignment BRT 1 operations would result in noise levels (57 dBA) that exceed the FTA Noise Impact Criteria at this location (56 dBA). The existing background noise level at this location is 57 dBA and the FTA criterion for severe impact is 62 dBA. Thus, the impact associated with Alignment BRT 1 would be minimal and would not result in substantial impairment of the use of this Section 4(f) resource. Operations for Alignments BRT 2 and BRT 3 would not have impacts on this resource.

### 7.4.3 METRORAIL ALTERNATIVE

The Metrorail Alternative would result in the construction of tracks, new stations, and associated ancillary facilities between the existing Orange Line near West Falls Church Station and Route 772 in Loudoun County. New Metrorail tracks would be constructed (at-grade, underground, or elevated); and new stations would be constructed in Tysons Corner (three or six stations, depending on alignment option, and at Wiehle Avenue, Reston Parkway, Herndon-Monroe, Route 28, Dulles Airport (underground), Route 606, and Route 772. Additional storage tracks would be added to the West Falls Church S&I Yard; a new Metrorail S&I Yard would be constructed in Loudoun County; and traction power substations and tie-breaker stations would be constructed along the Metrorail alignment.

Three sites are under consideration for the Metrorail S&I Yard: Site 7, Site 15, and Site 20:

- Site 7 is located on the north side of the Dulles Greenway between Broad Run and the Loudoun County Parkway.
- Site 15 is located south of Route 606, west of Horsepen Lake on Dulles Airport property.
- Site 20 is located in Loudoun County, west of Dulles Airport, between Broad Run and Route 606.

Overall, the construction and operation of an S&I Yard on Site 7 and 20 under the Metrorail Alternative would not require the permanent or temporary use of Section 4(f) or Section 6(f) resources. Sites 7 and 20 would not have any proximity impacts to Section 4(f) resources under the Metrorail Alternative.

Under the Metrorail Alternative, however, the construction of the yard lead to S&I Yard Site 15 could destroy Site 44LD0405, therefore, Site 15 (if selected) would require the permanent use of a Section 4(f) resource. Otherwise, the Metrorail Alternative would not require any permanent or temporary use of Section 4(f) or Section 6(f) resources.

In some cases, proximity impacts to Section 4(f) resources from the Metrorail Alternative, such as noise, vibration, air quality, or visual impacts, would occur, but would not substantially impair the use of any Section 4(f) resource. Further discussion of selected resources follows.

#### 7.4.3.1 George Mason High School Athletic Fields

The Metrorail Alternative would be located in the vicinity of this 4(f) resource. No impacts would occur at this site as a result of the Metrorail Alternative.

#### 7.4.3.2 Mount Royal Park

Although Mount Royal Park is adjacent to the north side of the existing West Falls Church S&I Yard, proximity impacts would not result from the addition of storage tracks at this yard. These tracks would be installed near the center of the yard, separated from the park by existing yard tracks and other facilities as well as by existing landscaping.

#### 7.4.3.3 Pimmit Run Stream Valley Park

At Pimmit Run, a new Metrorail bridge would be constructed between the existing Dulles Connector Road bridges. Pimmit Run Stream Valley Park is located on either side of the existing Dulles Connector Road and a trail connecting the two sections of parkland passes through the highway right-of-way under the bridges. The bridges would span the stream and the existing trail, without the need to place piers within the stream or adjacent trail. The area under the bridge spans and the segment of the trail that passes below the bridges are not part of the park.

Because of the existing highway bridges, the park itself is screened from proximity impacts related to the new Metrorail bridges. During construction, minor, short-term air quality and noise impacts could occur, but would be scheduled to cause the least interference possible. The proximity impacts would not result in a substantial impairment of the use of Pimmit Run Stream Valley Park.

#### 7.4.3.4 Olney Park

The Metrorail Alternative would be located in the vicinity of this 4(f) resource. No impacts would occur at this site as a result of the Metrorail Alternative.

#### 7.4.3.5 Scotts Run Stream Valley Park

The Metrorail Alternative would include the Tysons East Station, located north of Route 123 and adjacent to a portion of Scotts Run Stream Valley Park. The station facilities would include nine regular bus bays, 20 Kiss & Ride spaces, a pavilion, and a pedestrian bridge to the Tysons East Station platform. This alternative would not require the use of any parkland, and proximity impacts on the park would be minimal. Generally, most of the site is screened from view by existing landscaping that would remain, except near Route 123. Noise impacts

associated with the Kiss & Ride parking area adjacent to the park and the bus bays across the street, as well as from the Metrorail itself, have been analyzed and shown to be below FTA Noise Impact Criteria for unacceptable noise levels. During construction, air quality, noise, and visual impacts would occur. None of the proximity impacts would be substantial enough to impair the use of Scotts Run Stream Valley Park.

#### 7.4.3.6 Westgate Park

The Metrorail Alternative would be located in the vicinity of this 4(f) resource. No impacts would occur at this site as a result of the Metrorail Alternative.

#### 7.4.3.7 Ash Grove Historic Site

The Metrorail Alternative would be located in the vicinity of this 4(f) resource. No impacts would occur at this site as a result of the Metrorail Alternative.

#### 7.4.3.8 Wolf Trap Farm Park for the Performing Arts

The Metrorail Alternative would be located in the vicinity of this 4(f) resource. No impacts would occur at this site as a result of the Metrorail Alternative.

#### 7.4.3.9 Tamarack Park

The Metrorail Alternative would be located in the vicinity of this 4(f) resource. No impacts would occur at this site as a result of the Metrorail Alternative.

#### 7.4.3.10 Difficult Run Stream Valley Park

At Difficult Run, a new Metrorail bridge would be constructed between the existing DAAR and Dulles Toll Road bridges. Difficult Run Stream Valley Park is located on either side of the existing Dulles Toll Road and the trail passes through the highway right-of-way under the bridges. The new Metrorail bridge would span the stream and the existing trail, without the need to place piers within either the stream or the adjacent trail. The section of the trail under the highway bridges is not part of the park.

Because of the existing highway bridges, the park itself is screened from proximity impacts related to the new Metrorail bridge. During construction, minor, short-term air quality and noise impacts could occur, but construction would be scheduled to cause the least interference possible. The proximity impacts would not be substantial enough to result in impairment of use of Difficult Run Stream Valley Park.

#### 7.4.3.11 Wiehle/Sunset Hills Proposed Historic District (29-14)

Under the Metrorail Alternative, noise impacts from transit operations in the median of the DAAR would result in a predicted noise level of 62 dBA. The existing background noise level in the historic district is 61 dBA and the FTA severe impact criterion is 64 dBA (the impact criterion is 58 dBA). Predicted noise levels at the historic resources still standing within the proposed historic district (Robert Wiehle House, Smith Bowman Distillery, and Sunset Hills) do not exceed the FTA impact criterion, and are estimated at 49 dBA. The portion of the proposed historic district that is closest to the study area (the southeastern region) was used for noise modeling purposes but no longer contains historic structures. Thus, the impacts associated with the Metrorail alignment options would be minimal and would not result in the use of this resource.

#### 7.4.3.12 W&OD Railroad Regional Park

Under the Metrorail Alternative, new bridges would cross the W&OD Railroad Regional Park. Unlike the trails discussed under the Pimmit Run Stream Valley Park and the Difficult Run Stream Valley Park, the

W&OD Railroad Regional Park trail is parkland, a Section 4(f) resource, and a Section 6(f) resource. No bridge piers would be built in the park; piers would be spaced in order to avoid parkland. In addition, the bridge would be constructed in compliance with the *Northern Virginia Regional Park Authority Guidelines for the Development of W&OD Trail Bridge Crossings*.

The Metrorail Alternative would result in proximity impacts related to noise at the W&OD Railroad Regional Park. The noise levels at the new Metrorail crossing of the trail would be expected to exceed the FTA impact criteria. However, due to the location of this impact, in an area already affected by the four highway bridges of the DAAR and Dulles Toll Road, the increased noise levels would not lead to a degradation of the park experience. The park is crossed by many other transportation facilities and parallels I-66 for several miles; therefore, such noise levels are not unexpected by trail users. In addition, by placing the additional noise impact in a portion of the trail already affected by highway noise, the portions of the trail that are negatively affected by noise would be limited.

The new bridge would also result in visual impact to the trail. The area between the existing highway bridges now provides a light well, limiting the "dark tunnel" effect on the trail users. The planned widening of the highway bridges (not part of this project) along with the new bridge for the Metrorail would nearly eliminate this light well. Therefore, substantial visual impacts would occur. These impacts can be mitigated, however, with the incorporation of natural and artificial lighting under the bridge (e.g. lightwells between Metrorail bridges and highway bridges).

Construction of a bridge over the park would result in temporary increases in noise, vibration, and air-borne particulates. Continued access to the park would be maintained during hours of peak use. Best management practices (BMPs) would be used to minimize disruption of regular park activities.

Although proximity impacts to the park would occur, these impacts would not be so great that the use of this Section 4(f) property would be substantially impaired.

The W&OD Railroad Regional Park was developed in stages between 1977 and 1988 with money from the Land and Water Conservation Fund Act. Therefore, the park is afforded additional protection under Section 6(f) of the act. Under the Metrorail Alternative, new bridges would span the park completely and no bridge piers would be built in the park. Therefore, no conversion of Section 6(f) land would occur.

#### 7.4.3.13 Hutchison Elementary School Athletic Fields

The Metrorail Alternative would be located in the vicinity of this 4(f) resource. No impacts would occur at this site as a result of the Metrorail Alternative.

#### 7.4.3.14 Washington Dulles International Airport (53-8)

Because the Metrorail Station at Dulles Airport would be underground and provide access from inside the airport terminal, proximity impacts would not result at this location. The exception is during construction. During this period, the impacts to the terminal would be short-term. The tunneling activity would be staged in a portion of the airport away from the historic structures, near the car rental area. No vibration effects that would exceed FTA criteria. During a small portion of the construction period, the area directly over the station, directly in front of the terminal, would have to be excavated from the surface to allow for construction of the station itself. During this time, proximity impacts, including air quality, noise, and visual effects, would occur. None of these proximity impacts would permanently reduce the significance of the historic resource.

Once construction is complete, there would be no impacts to the Dulles Airport historic resources that would compromise the significance of the resources.

#### 7.4.3.15 Site 44LD0383 (HSEE-BR)

Site 44LD0383 is a prehistoric site of unknown date discovered in 1987. Phase II testing was conducted in 1988. Because the site was judged not to contain data sources of significant values, no further work was recommended. The site is not listed on the National Register, and may have been destroyed by construction of the Dulles Greenway. The Metrorail Alternative's new tracks would cross the property on which the site was reported. However, because the site has not been determined to warrant preservation in place, Section 4(f) does not apply.

#### 7.4.3.16 Site 44LD0378 (HNWB-1B)

Site 44LD0378 is a site where both prehistoric and historic artifacts were found in previous investigations. However, no further work was recommended because the site was sparse for its size. The site is not listed on the National Register, and has probably been destroyed by construction of the Dulles Greenway. The Metrorail Alternative would use the property on which the site was reported for the proposed S&I Yard Site 7. However, because the site has not been determined to warrant preservation in place, Section 4(f) does not apply.

#### 7.4.3.17 Site 44LD0380

The Metrorail Alternative would be located in the vicinity of this 4(f) resource. No impacts would occur at this site as a result of the Metrorail Alternative.

#### 7.4.3.18 Site 44LD0388

The Metrorail Alternative would be located in the vicinity of this 4(f) resource. No impacts would occur at this site as a result of the Metrorail Alternative.

### 7.4.4 BRT/METRORAIL ALTERNATIVE

Because the BRT/Metrorail Alternative would generally use existing travel lanes in the western portion of the Dulles Corridor (west of Tysons Corner), major construction in the Mid-Corridor, Dulles Airport, and Loudoun County areas would be limited to new median stations or offline stops at Spring Hill Road, Wiehle Avenue, Reston Parkway, Herndon-Monroe, and Route 28 (depending on the BRT alignment); and a BRT Maintenance and Storage Facility in Loudoun County. Minor improvements, such as the addition of BRT stops at Dulles Airport, Route 606, and Route 772, would also occur.

In the eastern portion of the corridor, Metrorail service would be extended from the Orange Line through Tysons Corner as described in Section 7.4.3.

The BRT/Metrorail Alternative, using any mix of alignments, would not require any permanent or temporary use of Section 4(f) or Section 6(f) resources.

Proximity impacts to Section 4(f) resources from the BRT/Metrorail Alternative, such as noise, vibration, air quality, or visual impacts, would be minimal and would not result in substantial impairment of use at any Section 4(f) resource. Further discussion of impacts to the following 4(f) resources can be found in Sections 7.4.2 (for the BRT Alternative) and Section 7.4.3 (for the Metrorail Alternative): Mount Royal Park, Pimmit

Run Stream Valley Park, Scotts Run Stream Valley Park, Wiehle/Sunset Hills Proposed Historic District, Hutchison Elementary School Athletic Fields, Dulles Airport, and House at Route 772.

### 7.4.5 PHASED IMPLEMENTATION ALTERNATIVE

With the Phased Implementation Alternative, all three Build Alternatives would be implemented sequentially, starting with one of the BRT alignments; then extending Metrorail from the Orange Line through Tysons Corner with BRT continuing to run in the remainder of the corridor; and finally converting the BRT system in the remainder of the corridor to Metrorail. Therefore, under the Phased Implementation Alternative, the same long-term and construction related effects, as detailed in Sections 7.4.2, 7.4.3, and 7.4.4, would occur. Additional effects from the removal of and/or change to certain facilities would not require use of Section 4(f) resources, conversion of 6(f) resources, or substantially impair the use of Section 4(f) resources.

## 7.5 AVOIDANCE ALTERNATIVES

None of the Build Alternatives would result in permanent or temporary use of Section 4(f) or Section 6(f) resources in the study area. No proximity impacts would occur that would substantially impair the use of these properties. Therefore, no avoidance alternatives were considered.

## 7.6 MEASURES TO MINIMIZE HARM

None of the Build Alternatives would result in a permanent or temporary use of any of the identified Section 4(f) or Section 6(f) resources in the study area.

Some proximity impacts would occur, although these would not result in substantial impairment resulting in the use of the Section 4(f) resources. The Build Alternatives incorporate measures to minimize potential harm to identified Section 4(f) resources in the study area.

The new bridge that spans the W&OD Railroad Regional Park would be built in compliance with *Northern Virginia Regional Park Authority Guideline for the Development of W&OD Trail Bridge Crossings* and requirements regarding openness, light wells, and minimum underpass height and width requirements would be met. Construction impacts would be mitigated by limiting construction periods as much as possible, avoiding construction during peak use times, and using best management practices.

## 7.7 CONCLUSION

Based on the evaluation conducted, none of the Build Alternatives would result in a permanent or temporary use of any of the identified Section 4(f) resources in the study area. Proximity impacts would not substantially impair the use of the properties. The Build Alternatives incorporate measures to minimize proximity impacts to identified Section 4(f) resources.

## 7.8 AGENCY COORDINATION

The Virginia Department of Historic Resources (VDHR), the Fairfax County Planning Office, the Loudoun County Planning Department, the Fairfax County School District, the FCPA, the NVRPA, and the NPS, were consulted during the preparation of this Section 4(f) Evaluation and Draft EIS.

In response to issues raised at the agency pre-scoping meetings in July 2000, comments were received by letter from the NPS on August 9, 2000, the NVRPA on August 10, 2000, and the FCPA on August 19, 2000. This correspondence is included in Appendix F. Representatives of the Dulles Corridor Rapid Transit Project Team met with the NPS on April 24, 2001 to discuss the status of the project and potential options for a Wolf Trap Farm Park Station. The minutes of this meeting are included in Appendix I. Representatives of the Dulles Corridor Rapid Transit Project Team met with the NVRPA on April 27, 2001 to discuss parklands and recreational resources within or near the study area. A copy of the minutes from this meeting can be found in Appendix I.

Representatives of the Dulles Corridor Rapid Transit Project Team met with the Virginia Department of Historic Resources on February 28, 2001. The NVRPA and the FCPA were contacted to discuss historic and archeological resources. Additional coordination among these agencies would take place as the project proceeds. A draft Programmatic Agreement among FTA, WMATA, DRPT, and the VDHR has been developed to comply with mitigation requirements under Section 106 of the National Historic Preservation Act (16 USC 470). A copy of the draft Programmatic Agreement is included in Appendix H.

A coordination meeting was held with the NVRPA on April 27, 2001 to discuss the Section 6(f) requirements regarding the W&OD Railroad Regional Park. The minutes from this meeting are in Appendix I.

## 7.9 SUMMARY OF EFFECTS

Table 7.9-1 presents a summary of the uses of Section 4(f) and Section 6(f) resources discussed in this chapter.

**Table 7.9-1: Summary of Section 4(f) and Section 6(f) Resource Effects**

| Alternative | Use of Section 4(f)/6(f) Resources | Mitigation |
|---|---|---|
| Baseline | None | None |
| BRT | None | None |
| BRT/Metrorail | None | None |
| Metrorail | None | None |
| Phased Implementation | None | None |

# Financial Analysis 8

# 8 FINANCIAL ANALYSIS

This chapter summarizes the preliminary Financial Plan for the Build Alternatives under consideration for the Dulles Corridor Rapid Transit Project.

**Section 8.1** provides an overview of the elements of the Financial Plan for the Dulles Corridor Rapid Transit Project.

**Section 8.2** provides an outline of the estimated construction costs for each of the Build Alternatives and identifies the funding partners and the preliminary funding plan for project implementation.

**Section 8.3** presents the operating costs and revenues for each of the alternatives. Washington Metropolitan Area Transit Authority (WMATA) is assumed to be the operator of each Build Alternative.

**Section 8.4** presents the construction cost and operating cost risks that could influence the financial plan.

As implementation of the Dulles Corridor Rapid Transit Project proceeds, the Financial Plan will further explore and detail the project financing in the context of each jurisdiction's financial capacity and their level of financial commitment. This Financial Plan will be developed to support an application for federal funding once the *National Environmental Policy Act of 1969* (NEPA) process is complete.

## 8.1 OVERVIEW

The Financial Plan for the Dulles Corridor Rapid Transit Project provides a summary of the capital costs and potential funding sources for each Build Alternative; identifies the annual operating subsidy requirements; and identifies some of the risks and uncertainties associated with the project funding and possible strategies for addressing the risks.

- **Design and Construction Costs.** The capital costs for each alternative are identified on the basis of the construction schedule and construction element. Construction program costs include the transit fleet requirements for each alternative.
- **Capital Funding.** Costs are allocated among the identified funding partners, and potential funding sources are identified.
- **Operating Costs.** The incremental operating and maintenance (O&M) costs for regional and local bus, Metrobus (WMATA's regional bus service), BRT, and Metrorail services are identified for each alternative.
- **Operating Revenues.** The incremental change in fare and other operating revenue is identified for each Build Alternative.

- **Subsidy Requirements.** The project's anticipated subsidy requirements and allocation among WMATA compact member jurisdictions in the opening year and forecast year are presented for each alternative.
- **Risk Assessment.** An overview of the risks and uncertainties involved with the project funding is presented. Possible strategies for addressing these risks are also discussed.

Capital costs are estimated in second quarter Year 2001 dollars, and then escalated to fiscal year-of-expenditure dollars. All references to fiscal year (FY) refer to DRPT and WMATA's fiscal year (July 1 through June 30).

## 8.2 CAPITAL FUNDING PLAN

This section outlines the estimated costs for each of the Build Alternatives and identifies the funding partners and the preliminary funding plan for implementation.

### 8.2.1 PROJECT COST ESTIMATE

The capital cost estimates are based on the General Plans (Volumes III and IV) for the four Build Alternatives. Each capital cost estimate is independent of the other Build Alternatives and is based on the buildup of the line, systems, and facility elements of the General Plans. The capital cost schedule assumes the opening date for BRT at the end of 2005; BRT/Metrorail at the end of 2006; Metrorail at the end of 2010. Phased Implementation would have an opening date for BRT from West Falls Church to Loudoun County at the end of 2005; Metrorail through Tysons Corner at the end of 2006; and Metrorail to Loudoun County at the end of 2010.

Inflation projections are used to convert year 2001 constant dollars into year-of-expenditure amounts. Initial cost estimates assume an annual three percent rate of inflation based on the assumed construction schedules discussed later in this chapter. Future refinements to the project's Financial Plan will apply regional inflation projections of the Engineering News-Record Construction Cost Index (CCI) and Building Cost Index (BCI).

Tables 8.2-1 and 8.2-2 summarize the capital costs for each of the four Build Alternatives. The Build Alternative costs range from $350.7 million for the BRT Alternative to $3,475.0 million for Phased Implementation in year-of-expenditure dollars (including financing).

The capital cost methodology and categories follow FTA guidelines for capital cost reporting. The guideway category includes the at-grade, aerial and subway/tunnel construction costs, including trackwork for Metrorail. The yards and shops category includes site development, parking, vehicle storage and maintenance buildings, office support buildings and shop equipment. The systems element category includes costs for control systems, electrification, communications, and revenue collection. Passenger station costs include the stations, parking lots, access roads, parking garages, pedestrian overpasses and vertical access, and support infrastructure (bus park-and-rides, Kiss & Ride).

The vehicle costs include Metrorail vehicles, BRT vehicles, and buses. The cost estimates for Metrorail and Phased Implementation are for trains with eight-car consists. Special conditions include anticipated costs for environmental mitigation, roadway modifications, utility modifications and demolitions. Right-of-way costs include land and relocation costs, if required.

Soft costs include preliminary engineering, final design, construction management, project management, owner administration, change order allowance, before and after study (required as condition of a Full Funding Grant

**Table 8.2-1: Summary of Capital Costs for Build Alternatives (millions year–of-expenditure dollars)**

| Cost Category (Opening Year) | Build Alternatives | | | |
|---|---|---|---|---|
| | BRT[1] (2005) | Metrorail[2] (2010) | BRT/Metrorail[3] (2006) | Phased Implementation[3] (2005 – 2010) |
| **Number of Stations/Stops:** | **9** | **11** | **11** | **11** |
| Guideway Elements | $ 0 | $ 691.6 | $247.5 | $685.3 |
| Yards & Shops | $50.7 | $144.7 | $92.1 | $192.6 |
| System Elements | $24.6 | $312.8 | $116.7 | $320.5 |
| Passenger Stations | $165.3 | $627.2 | $385.2 | $696.6 |
| Vehicles | $84.4 | $465.1 | $149.9 | $498.4 |
| Special Conditions | $29.5 | $101.3 | $78.5 | $104.4 |
| Right-of-Way | $41.1 | $143.6 | $110.8 | $143.6 |
| Soft Costs | $85.9 | $615.0 | $273.5 | $654.0 |
| Subtotal: Capital | $481.4 | $3,101.3 | $1,454.1 | $3,295.4 |
| Financing | $8.0 | $145.5 | $42.6 | $179.6 |
| Total | $489.4 | $3,246,8 | $1,496.7 | $3,475.0 |

1 Assumes BRT 1
2 Assumes T6 Metrorail alignment
3 Assumes Alignment BRT 1 and Metrorail T6

**Table 8.2-2: Summary of Year-of-Expenditure Capital Cost Ranges for the Build Alternatives and Alignment Options**

| Alignment Option | Capital Cost | Financing Cost | Total Cost in Millions |
|---|---|---|---|
| **BRT** | | | |
| BRT 1 | $481.4 | $8.0 | $489.4 |
| BRT 2 | $349.1 | $8.0 | $357.1 |
| BRT 3 | $342.7 | $8.0 | $350.7 |
| **Metrorail** | | | |
| T1 | $2,937.3 | $145.5 | $3,082.8 |
| T6 | $3,101.3 | $145.5 | $3,246.8 |
| T9 | $2,982.6 | $145.5 | $3,128.1 |
| T4 | $3,080.4 | $145.5 | $3,225.9 |
| **BRT/Metrorail** | | | |
| BRT 1/T1 | $1,303.1 | $42.6 | $1,345.7 |
| BRT 1/T6 | $1,454.1 | $42.6 | $1,496.7 |
| BRT 1/T9 | $1,344.7 | $42.6 | $1,387.3 |
| BRT 1/T4 | $1,434.6 | $42.6 | $1,477.2 |
| **Phased Implementation** | | | |
| T1 | $3,131.4 | $179.6 | $3,311.0 |
| T6 | $3,295.4 | $179.6 | $3,475.0 |
| T9 | $3,176.7 | $179.6 | $3,356.3 |
| T4 | $3,274.5 | $179.6 | $3,454.1 |

Agreement), insurance, and project start-up/testing. The cost to complete NEPA ($40 million) is not included. Project financing requirements and approach are discussed in Section 8.2.6.

The capital costs presented above in Table 8.2-1 vary depending upon the BRT alignment option and Metrorail alignment selected. The year-of-expenditure capital cost range for the BRT, BRT/Metrorail, Metrorail, and Phased Implementation alternatives and alignment options are presented in Table 8.2-2. The BRT cost differences reflect the difference in the number of stations (or stops), and BRT fleet sizes between the alignment options. The cost range in the BRT/Metrorail, Metrorail, and Phased Implementation estimates reflects the various alignments under consideration in the Tysons Corner area. The BRT/Metrorail and Phased Implementation alternatives assume construction of BRT 1 stations and stops.

### 8.2.2 FUNDING SECURED TO DATE

To date, Federal and state funding sources for the Dulles Corridor Rapid Transit Project include both appropriations and future funding commitments. Funds secured, or authorized to date for the project total $300.8 million. These include:

- **Federal.** Between FY 1999 and FY 2002, Congress appropriated $117.0 million in Section 5309 New Starts funding for the project. The FY 2001 Department of Transportation and Related Agencies Appropriations Act provided FTA with a New Starts contingent commitment authority of $217.8 million for the Dulles Corridor Rapid Transit Project. The contingent commitment may not, however, remain available in the next federal reauthorization period.

- **Non-Federal Funding.** A total of $83 million in non-Federal funding was appropriated for the project through FY 2002. The Commonwealth of Virginia appropriated $2 million from the Commonwealth Mass Transit Fund and programmed $75 million from funding sources created in the Virginia Transportation Act of 2000. In addition, $6 million in Northern Virginia Transportation District Bond proceeds were allocated to the project by the Virginia General Assembly in its 1999 session. These bonds, backed by Commonwealth recordation taxes, were issued to support priority transportation projects identified by localities.

Of the $117.0 million in Federal funds appropriated to date, $32 million is being used to conduct preliminary engineering and complete the NEPA environmental review process. The remaining $85 million is intended for further design and construction of the Dulles Corridor Rapid Transit Project. Of the $83 million in non-Federal funds appropriated to date, $8 million is being used to conduct preliminary engineering and complete the NEPA environmental review process. The remaining $75 million is available to fund further design and construction of the Dulles Corridor Rapid Transit Project. This funding is programmed in the FY 2001-2002 *Virginia Transportation Development Plan*.

### 8.2.3 CAPITAL COST AND SCHEDULE

Capital cost estimates for each of the four Build Alternatives were developed on the basis of the General Plans for the project. The capital costs in this section do not include the cost of financing. The summary financing costs are presented in Section 8.2.1, and discussed and presented in detail in Section 8.2.6. The estimates reflect the total project costs including right-of-way acquisition, site preparation, facilities construction, vehicles, purchase and installation of systemwide facilities and equipment, restoration of adjacent infrastructure, engineering and design, project management, construction management, owner administration, contractor

bonding, contingencies, and special condition costs. For financial planning purposes, the project schedule assumes BRT revenue service would begin in late 2005, BRT/Metrorail service would begin in late 2006, and full Metrorail service would begin in late 2010. Under Phased Implementation, the same dates were assumed, revenue service would begin late 2005 for BRT, late 2006 for Metrorail through Tysons Corner, and 2010 for Metrorail to Loudoun County.

### 8.2.3.1 BRT Alternative

Table 8.2-3 presents a summary of the capital cost estimates developed for BRT 1. Construction of the BRT Alternative would be completed in late 2005. The total cost for BRT 1 is $481.4 million in year-of-expenditure dollars.

**Table 8.2–3: Capital Cost Estimate and Schedule – BRT 1 (millions year-of-expenditure dollars, excludes financing costs)**

| Cost Category | Total | FY03 | FY04 | FY05 | FY06 |
|---|---|---|---|---|---|
| Guideway Elements | $0 | | | | |
| Yard & Shops | $50.7 | | $18.3 | $26.6 | $5.8 |
| Systems Elements | $24.6 | | $8.9 | $12.9 | $2.8 |
| Passenger Stations | $165.3 | | $59.8 | $86.6 | $18.9 |
| Vehicles | $84.4 | $14.6 | $17.9 | $33.3 | $18.6 |
| Special Conditions | $29.5 | | $10.7 | $15.4 | $3.4 |
| Right-of-Way | $41.1 | $41.1 | | | |
| Soft Costs | $85.9 | $13.8 | $27.2 | $35.0 | $9.9 |
| Total | $481.4 | $69.5 | $142.8 | $209.8 | $59.4 |

Assumes BRT 1, which includes five BRT stations and three BRT stops.

BRT 2 and BRT 3 are estimated to cost $349.1 million and $342.7 million in year-of-expenditure dollars, respectively.

All three BRT alignments were designed to allow for future conversion to rail as demand in the Dulles Corridor grows. For the purposes of this discussion, BRT 2 is closest to the system that would be constructed if BRT were to be implemented without any provisions for rail conversion. This is because the stations within the DAAR median are limited to the platform length and ancillary space sufficient to support BRT operations.

### 8.2.3.2 Metrorail Alternative

Table 8.2-4 presents a summary of the capital costs for the Metrorail Alternative with rail service from the Orange Line to Route 772 in Loudoun County. Construction of the Metrorail Alternative would be completed in late 2010. Total capital costs for Alignment T6 are $3,101.3 million in year-of-expenditure dollars. Total estimated costs for Alignments T1, T9, and T4 are $2,937.3 million, $2,982.6 million, and $3,080.4 million in year-of-expenditure dollars, respectively.

**Table 8.2–4: Capital Cost Estimate and Schedule – Metrorail Alternative (millions year-of-expenditure dollars, excludes financing costs)**

| Cost Category | Total | FY03 | FY04 | FY05 | FY06 | FY07 | FY08 | FY09 | FY10 | FY11 |
|---|---|---|---|---|---|---|---|---|---|---|
| Guideway | $691.6 | | $21.3 | $97.5 | $102.9 | $82.4 | $121.6 | $153.3 | $104.8 | $7.8 |
| Yard & Shops | $144.7 | | | $15.0 | $21.7 | $4.7 | $13.9 | $52.4 | $37.0 | |
| Systems | $312.8 | | | $24.2 | $56.6 | $14.8 | $26.4 | $88.6 | $81.0 | $21.2 |

| Cost Category | Total | FY03 | FY04 | FY05 | FY06 | FY07 | FY08 | FY09 | FY10 | FY11 |
|---|---|---|---|---|---|---|---|---|---|---|
| Passenger Stations | $627.2 | | $18.8 | $86.2 | $91.0 | $74.8 | $111.9 | $141.0 | $96.3 | $7.2 |
| Vehicles | $465.1 | $22.2 | $27.2 | $50.7 | $23.1 | $40.7 | $90.4 | $110.9 | $86.4 | $13.5 |
| Special Conditions | $101.3 | | $14.2 | $19.3 | $6.5 | $16.6 | $27.2 | $13.7 | $3.7 | |
| Right-of-Way | $143.6 | $52.0 | $17.7 | | $55.1 | $18.8 | | | | |
| Soft Costs | $615.0 | $24.8 | $50.1 | $53.5 | $90.9 | $94.1 | $101.0 | $104.0 | $75.9 | $20.7 |
| Total | $3,101.3 | $99.1 | $149.3 | $346.3 | $447.7 | $347.0 | $492.4 | $663.9 | $485.1 | $70.5 |

Assumes Alignment T6, which includes 11 stations.

#### 8.2.3.3 BRT/Metrorail Alternative

Table 8.2-5 presents a summary of capital costs for the BRT/Metrorail Alternative with rail service from the Orange Line to the Tysons West Station, and BRT continuing to Loudoun County. Construction of the BRT/Metrorail Alternative would be completed in late 2006. Total capital costs for the alternative, assuming BRT 1 and Alignment T6, are estimated to be $1,454.1 million in year-of-expenditure dollars.

Costs for the combination of BRT 1 with Alignments T1, T9, and T4 are estimated to be $1,303.1 million, $1,344.7 million, and $1,434.6 million in year-of-expenditure dollars, respectively.

**Table 8.2–5: Capital Cost Estimate and Schedule – BRT/Metrorail Alternative (millions year-of-expenditure dollars, excludes financing costs)**

| Cost Category | Total | FY03 | FY04 | FY05 | FY06 | FY07 |
|---|---|---|---|---|---|---|
| Guideway | $247.5 | | $21.3 | $97.5 | $102.9 | $25.9 |
| Yard & Shops | $92.1 | | $18.4 | $41.6 | $27.5 | $4.7 |
| Systems | $116.7 | | $7.6 | $35.2 | $59.0 | $14.8 |
| Passenger Stations | $385.2 | | $79.0 | $173.3 | $110.0 | $22.9 |
| Vehicles | $149.9 | $22.2 | $35.2 | $61.9 | $25.5 | $5.1 |
| Special Conditions | $78.5 | $6.0 | $21.9 | $33.9 | $14.9 | $1.8 |
| Right-of-Way | $110.8 | $93.1 | $17.7 | | | |
| Soft Costs | $273.5 | $38.2 | $76.5 | $87.5 | $60.8 | $10.3 |
| Total | $1,454.1 | $159.5 | $277.5 | $530.9 | $400.6 | $85.5 |

Assumes BRT 1 and Alignment T6, which include four Metrorail stations, four BRT stations, and three BRT stops.

#### 8.2.3.4 Phased Implementation Alternative

The capital costs for the Phased Implementation Alternative are estimated to be $3,295.4 million in year-of-expenditure dollars (see Table 8.2-6). The overall capital costs would be higher than the Metrorail Alternative due to the additional costs required to construct BRT in the initial phase. Additional costs include modifying the West Falls Church Station; building the Spring Hill and Dulles Airport BRT stations and stops; conversion of the Dulles Airport Access Road (DAAR) BRT stations to Metrorail; purchasing the BRT vehicles; and building the BRT Maintenance and Storage Facility. These costs are estimated to add approximately $194.1 million (year-of-expenditure) to the overall cost of the Metrorail Alternative.

Phased Implementation capital costs will vary depending on which rail alignment is selected in Tysons Corner. The year-of-expenditure alignment costs are as follows: $3,131.4 million for T1, $3,295.4 million for T6, $3,176.7 million for T9, and $3,274.5 million for T4.

**Table 8.2–6: Capital Cost Estimate and Schedule – Phased Implementation Alternative (millions YOE dollars, excludes financing costs)**

| Cost Category | Total | FY03 | FY04 | FY05 | FY06 | FY07 | FY08 | FY09 | FY10 | FY11 |
|---|---|---|---|---|---|---|---|---|---|---|
| Guideway | $685.3 | | $21.3 | $97.5 | $102.9 | $82.4 | $119.7 | $150.8 | $103.1 | $7.7 |
| Yard & Shops | $192.6 | | $32.9 | $47.6 | $10.4 | $0.0 | $13.7 | $51.5 | $36.4 | |
| Systems | $320.5 | | $8.9 | $37.1 | $59.4 | $14.8 | $24.3 | $81.7 | $74.6 | $19.6 |
| Passenger Stations | $696.6 | | $82.8 | $191.5 | $129.6 | $62.0 | $72.4 | $91.3 | $62.4 | $4.7 |
| Vehicles | $498.4 | $29.7 | $36.4 | $67.8 | $34.3 | $39.3 | $89.8 | $106.3 | $81.1 | $13.7 |
| Special Conditions | $104.4 | | $24.9 | $34.7 | $9.8 | $10.2 | $15.1 | $7.6 | $2.1 | |
| Right-of-Way | $143.6 | $93.1 | $17.7 | | $24.5 | $8.4 | | | | |
| Soft Costs | $654.0 | $40.6 | $81.2 | $92.7 | $99.0 | $82.7 | $86.3 | $88.9 | $64.8 | $17.7 |
| Total | $3,295.4 | $163.4 | $306.1 | $569.0 | $470.0 | $299.8 | $421.2 | $578.1 | $424.5 | $63.4 |

Assumes BRT 1 and Alignment T6, which ultimately includes 11 Metrorail stations.

### 8.2.4 CAPITAL FUNDING PARTNERS AND SOURCES

FTA, the Commonwealth of Virginia, Fairfax and Loudoun counties, and the Metropolitan Washington Airports Authority (MWAA) would provide capital funding for the Dulles Corridor Rapid Transit Project. In addition, there is the possibility of private funding for portions of the project through the implementation of the Commonwealth of Virginia's Public-Private Transportation Act of 1995 (PPTA). The required funding amounts from each jurisdiction vary for each alternative.

The basis for funding extensions to the existing Metrorail system, such as proposed for the Dulles Corridor Rapid Transit Project, is stated in the WMATA Board of Directors Resolution #2000-35, dated May 25, 2000:

> "All design, engineering, construction and financing costs of an Extension, including revenue vehicles and required facilities and equipment, which is added to the Adopted Regional System (ARS), including costs associated with delay in receipt of federal funding and extraordinary costs, would be funded by the jurisdiction in which the Extension is located with local, state, federal and other funds, without cost to the other Compact member jurisdictions."

Each of the Build Alternatives would be considered an "Extension to the Adopted Regional System," and therefore the WMATA Compact member jurisdiction (in this case, Virginia) would be responsible for providing the required non-Federal funding for the project. A brief description of the funding partners and anticipated funding sources is provided below. Section 8.2.5 describes how the capital costs might be allocated among the partners.

#### 8.2.4.1 Federal Transit Administration

FTA provides grants to state and local governments for the development of new and improved transit facilities and services. FTA's Section 5309 New Starts program supplies funds for fixed guideway projects, including both BRT and rail. The program is discretionary, meaning that funding decisions are made on a project-by-project basis. The New Starts program is authorized in multi-year budget cycles. For FY 1998 to 2003, the Transportation Equity Act for the 21$^{st}$ Century (TEA-21) authorized approximately $6 billion dollars for the New Starts program. Funding beyond FY 2003 is dependent upon reauthorization of the FTA program.

The Section 5309 New Starts program is highly competitive. To be eligible for funding, a project must be authorized by law and recommended for funding by FTA on the basis of New Starts Criteria to determine project justification and local financial commitment.

The Dulles Corridor Rapid Transit Project was authorized for New Starts funding in TEA-21. FTA provided the Dulles Corridor BRT 2 Alignment a "Recommended" rating for FY 2002, but has yet to rate the Metrorail Alternative.

At the time of this Draft EIS, Congress has appropriated $117.0 million in Section 5309 New Starts funding and authorized a total of $217.8 million in contingent commitment authority for the project. The project sponsor has expressed an interest in the federal government eventually funding 60 percent of the BRT and 50 percent of the Metrorail capital costs through FTA's New Starts program. Although these funding levels meet the current statutory maximum of 80 percent of project capital costs being funded through FTA's New Starts program, they are above the current Congressional desire to fund at no higher than 60 percent and the Administration's target of 50 percent in FY 2004. The Conference Report accompanying the FY 2002 Department of Transportation Appropriates Act directs "*FTA not to sign any new full funding grant agreements after September 30, 2002 that have a maximum federal share of higher than 60 percent. This policy will provide local sponsors sufficient time to increase their contributions to these projects.*" Federal commitments to fund New Start projects are made by a Full Funding Grant Agreement (FFGA) between FTA and the project sponsor (grantee). The FFGA defines the project to receive federal financial assistance, including cost and schedule, and commits to a maximum level of federal assistance, subject to appropriation. The FFGA assures the grantee of predictable financial support for the project, subject to appropriation, while placing a ceiling on the amount of that federal support. Any subsequent cost increases or overruns are the responsibility of the grantee.

#### 8.2.4.2 Commonwealth of Virginia

The Commonwealth of Virginia, through the Department of Rail and Public Transportation (DRPT), is the project sponsor and agency responsible for project implementation and establishing the non-federal share of the project funding in cooperation with Fairfax County, Loudoun County, and Metropolitan Washington Airports Authority (MWAA).

DRPT is an independent agency reporting to the Virginia Secretary of Transportation and is responsible for planning and implementing over $200 million per year in public transportation services within the state. In addition, the Commonwealth has received a proposal for design and construction of the project through the Public-Private Transportation Act (PPTA) process. The proposal is presently under review.

The Commonwealth has already programmed $77 million in matching funds to the project (see Section 8.2.2), which represents 79 percent of the State's share of BRT funding. There has been considerable progress at the state level to secure the additional non-federal share of the funding. This includes the CTB amending its policy in September 2001 to reserve a minimum of 85 percent of excess Dulles Toll Road revenues for public transportation, passing legislation authorizing the establishment of special transportation improvements districts within Fairfax County and the Town of Herndon, and legislation passed April 17, 2002 authorizing a November 2002 referendum instituting a one-half percent sales tax within Northern Virginia for transportation purposes. This referendum, if passed, has proposed $350 million in bonding authorization for the Dulles Corridor Rapid Transit Project. Additional funding is anticipated from the following sources.

### Virginia Priority Transportation Fund

Traditionally, transportation improvements within Virginia have been funded using motor vehicle fuel taxes (state and federal), vehicle title fees, license tag fees, and one-half cent of the Commonwealth's sales tax. In May 2000, the Virginia General Assembly passed the Virginia Transportation Act (VTA); this legislation provided additional funding sources to accelerate the construction of priority transportation projects throughout the Commonwealth.

With the passage of the VTA, the Priority Transportation Fund was created using existing permanent sources of revenue for transportation improvements. The Priority Transportation Fund relies upon General Fund revenue, bond sales proceeds based on future federal appropriations, a more efficient method for collecting state motor fuel taxes, and a portion of the existing tax on insurance premiums. A total of $75 million in Priority Transportation Fund revenues have been programmed for the Dulles Corridor Rapid Transit Project. Additional Priority Transportation Fund revenues may be allocated to the project in the future.

On May 16, 2002, the Commonwealth Transportation Board voted to accept the tentative "Six-Year Program" for transportation projects in Virginia. The "Six-Year Program" retained the Commonwealth's $75 million commitment to the Dulles Corridor Rapid Transit Project.

### Dulles Toll Road Surplus Funds

The Dulles Toll Road was constructed by the Virginia Department of Transportation (VDOT) on the outside of the DAAR and opened in 1984. It extends from the Capital Beltway to Route 28 where it connects with the Dulles Greenway, a privately-owned and operated toll road. It was financed using Transportation Facilities Bonds issued by the Commonwealth of Virginia. The debt service on these bonds is scheduled to be retired in 2016. Toll rates for automobiles range from $0.25 to $0.85, depending upon the length of the trip. Electronic toll collection is available at all toll plazas for cars equipped with transponders. Currently, no discount is provided for electronic payment.

Tolls collected on the Dulles Toll Road currently exceed the levels required to support operations, maintenance, and debt service. Surplus toll revenues for FY 2002 are estimated by VDOT to total $12 million. Based on a policy adopted by the Commonwealth Transportation Board (CTB) in 1990, any surplus revenues are to be used to fund transportation improvements in the corridor. In the past, these funds have been used to construct additional lanes, improve interchanges, build park-and-ride lots, and enhance express bus service. The CTB amended this policy in September 2001 to reserve a minimum of 85 percent of excess Dulles Toll Road revenues for public transportation initiatives in the Dulles Corridor beginning in FY 2003. It is assumed that the Dulles Corridor Rapid Transit Project would be considered a priority use for these excess revenues through 2016, when required toll collection ends.

DRPT recently conducted an analysis to evaluate the revenue potential of the Dulles Toll Road under various operating and financing scenarios. A number of options were considered, including refinancing of the existing debt, toll increases and issuance of new revenue bonds, and variable toll rates for peak period travel. All of the options would involve refinancing the current debt, now scheduled for retirement in 2016, and an extension of tolls until 2037. The total amount of revenue available is also dependent on current market conditions and the issuer of any debt support by Dulles Toll Road revenues. Bonds that are backed by the "full faith and credit" of the Commonwealth require a lower debt-coverage ratio, and therefore, have more revenues available for transportation improvements. Other options considered, including the use of private bond insurance, would have lower proceeds.

Assuming that a minimum of 85 percent of excess toll road revenues are available to finance new bonds, the additional revenue generated by the Dulles Toll Road would range from about $200 million from refinancing only (no toll increases) to over $800 million (requires a $0.50 toll increase in 2003 and additional $0.25 increases every three years through 2015). A $0.25 toll increase in 2003 and every three years through 2015 would generate over $725 million in funding that could be available for the Dulles Corridor Rapid Transit Project. These projected toll increases would make the tolls for the Dulles Toll Road comparable to the rates currently charged on the Dulles Greenway. Currently, the tolls for the Dulles Toll Road, which have not been not been raised since its opening in 1984, are considered well below the market rate for comparable facilities nationwide.

Under current CTB policy, a minimum of 85 percent of surplus toll road revenues would be available to the Dulles Corridor Rapid Transit Project between 2003 and 2016. Based on current toll rates and projected usage, it is estimated that as much as $150 million could be generated without issuing new debt. Any refinancing of the existing Dulles Toll Road debt or issuance of new debt would require policy action from the CTB. Another option is to transfer ownership and operation of the Dulles Toll Road to a new entity, such as a regional transportation authority or special purpose (63-20) corporation that would then be responsible for issuing and repaying any new bonds.

#### Public-Private Transportation Act of 1995

The PPTA is the legislative framework enabling the Commonwealth of Virginia, qualifying local governments and certain other political entities to enter into agreements authorizing private entities to acquire, construct, improve, maintain, and/or operate qualifying transportation facilities. The PPTA became effective July 1, 1995, following a year-long collaboration among the General Assembly, representatives from the private sector, and the transportation agencies.

PPTA grants responsible public entities the authority to allow private entities to construct and/or operate qualifying transportation facilities if the public entities determine there is a need for the facilities and private involvement may provide the facilities to the public in a timely or cost-effective fashion. Individually negotiated comprehensive agreements define the respective rights and obligations of the responsible public entity and the private operator.

A private consortium has proposed to design and build a high-capacity transit system in the Dulles Corridor. The conceptual proposal was submitted and evaluated under the terms of the PPTA. Advancement of the PPTA initiative to a detailed proposal submittal and review is pending the completion of the environmental analysis.

### 8.2.4.3 Fairfax County

Approximately 16 miles of the 24-mile long project is located in Fairfax County. Fairfax County is a WMATA compact member and also operates its own public transit service. The county budget obligation for Metrorail and Metrobus operation and capital funding comes from a combination of state aid, gas tax revenue, General Fund transfer, state bonds, and other sources. For FY 2002, $13.0 million in capital funding was transferred to WMATA for completion of the Fifth Interim Capital Contribution Agreement (ICCA-V), Rail Reliability Program, Infrastructure Renewal Program (IRP), System Enhancement Program (SEP), and System Access Program (SAP). Based on the WMATA Compact, Fairfax County allocated approximately $48.8 million in FY 2002 for Metrorail and Metrobus operations.

For the Dulles Corridor Rapid Transit Project, Fairfax County is considering the following capital funding sources.

### Transportation Improvement Tax District

During the 2001 session, the Virginia General Assembly passed legislation that authorized the establishment of special transportation improvement districts within Fairfax County and the Town of Herndon to support construction of the Dulles Corridor Rapid Transit Project. This legislation was modeled after the 1987 Multicounty Transportation Improvement Districts Act and earlier legislation creating a special tax district to finance transportation improvements in Fairfax and Loudoun Counties (Route 28). This enabling legislation is a required precursor to any petition from district landowners to create such a district.

Several steps are required to form a district and begin collecting revenues. First, a majority of landowners must submit a petition to the Fairfax County Board of Supervisors requesting the establishment of a transportation improvement tax district to support the Dulles Corridor Rapid Transit Project. This petition must be signed by the owners of at least 51 percent of either the land area or the assessed value of the real property within the proposed district that is zoned or now in commercial, multi-family, or industrial use. Their petition must include a description of the proposed district boundaries, summary of the proposed transportation improvements, outline of the plan for implementing the improvements, and description of the benefits of the proposed transportation improvements. After the petition is filed, a public hearing to consider the petition would be held to solicit comments from residents and owners of property within the proposed district.

The Fairfax County Board of Supervisors may then consider a resolution creating the district. If the resolution passes, a commission comprised of local elected officials and a member of the Commonwealth Transportation Board would then be appointed to govern the district. An advisory board of landowners in the district would then be created to advise the Commission and district landowners on management of the district.

An analysis recently conducted by DRPT evaluated the revenue potential of a Dulles Corridor Transportation Improvement Tax District using different growth scenarios and tax rate options. This analysis was based on the current valuation of properties within the boundaries of a proposed district, known development plans, estimates of future development, and projected increases in property values. A term of 35 years was assumed for all bonds issued. To maximize the revenue potential of any transportation improvement district, both standard and capital appreciation bonds would be used. Capital appreciation bonds – which pay no interest until maturity – are commonly used to leverage additional funding from a revenue source that is expected to grow over time.

Using a reasonable growth scenario for the Dulles Corridor, a tax rate of $0.20 for every $100 of assessed value could support between $600 and $900 million in bond proceeds. Under more conservative growth assumptions, the potential bond proceeds would range from $500 to $700 million. If the maximum annual levy included in the district's enabling legislation ($0.40 for every $100 of assessed value) was approved by property owners, the projected bond proceeds would more than double.

The total amount of revenue generated would vary depending on current market conditions and the issuer of any debt supported by the transportation improvement district. Bonds that are backed by the "full faith and credit" of the Commonwealth require a lower debt-coverage ratio, and therefore have more revenues available for transportation improvements. Other options considered, including the use of private bond insurance, would have lower proceeds. Securing this level of bond financing from the private capital markets would also require reliable revenue forecasts for the transportation improvement district that could withstand the scrutiny of rating agencies and investors.

A landowner's group was formed in mid-2001 to begin the administrative process necessary to create a transportation improvement district to support the Dulles Corridor Rapid Transit Project. Property owners in the Tysons Corner and Reston/Herndon areas are now organizing and considering whether to submit a petition. The revenue potential of any transportation improvement tax district would ultimately depend on the terms agreed to by a majority of the district's property owners.

Submittal of this petition to the Fairfax County Board of Supervisors will depend upon the timing of the locally preferred alternative selection and the issuance of the Final Environmental Impact Statement (EIS). The final petition would outline the proposed structure of the district (or districts), annual levy amounts, and a schedule for initiating tax collections.

#### Fairfax County General Obligation Debt

If Transportation Tax District revenues are not sufficient, Fairfax County may consider supporting its capital obligations for the Dulles Corridor Rapid Transit project through a voter approved general obligation debt offering. The County is actively examining options for increasing debt capacity in the future. Fairfax County has shown a strong commitment to fund Metrorail construction by issuing $125.3 million in general obligation bonds through voter approval. In FY 2002, Fairfax County issued approximately $160 million in General Obligation debt, of which $4.9 million was for Metrorail construction.

Fairfax County commonly issues tax-exempt general obligation bonds to finance major capital projects. By law, general obligation bonds must be approved in advance by county voters in a referendum. The county continues to maintain its status as a top rated issuer of tax-exempt securities. The county has the highest credit ratings possible for a local government for its general obligation bonds: AAA from Moody's Investors Service, Inc., AAA from Standard and Poor's Corporation, and AAA from Fitch Investor Service. The County has had an AAA rating since October 1975 when it first received a rating from Moody's. Standard and Poor's Corporation first gave Fairfax County an AAA rating in October 1978, which has been maintained by the County. The Fitch Investor Service rating was first received in the spring of 1997. The high credit ratings enable Fairfax County to sell bonds at interest rates significantly lower than those of most municipalities, representing substantial savings for County taxpayers throughout the lifetime of the bonds.

There is no legal limit on the amount of general obligation bonded indebtedness that Fairfax County can at any time incur or have outstanding. However, since 1975, the Board of Supervisors has self-imposed limitations which require that the County's long-term debt not exceed 3 percent of the total market value of taxable real and personal property in the county. The limits also require that annual debt service not exceed 10 percent of annual Combined General Fund disbursements. At the close of FY 2000, these levels were 1.49 percent and 8.9 percent, respectively. On June 30, 2000, total general obligation bond indebtedness was $1,380 million. Authorized-but-not-issued bonds on June 30, 2000 totaled $750 million.

### 8.2.4.4 Metropolitan Washington Airports Authority

In 1987, the operating responsibility for the Washington Dulles International Airport (Dulles Airport) and Ronald Reagan Washington National Airport (National Airport) was transferred by long-term lease from the U.S. Department of Transportation (U.S. DOT through FAA) to the newly formed Metropolitan Washington Airports Authority (MWAA). The Authority was created by legislation enacted by the Commonwealth of Virginia and the District of Columbia, consistent with federal legislation authorizing the lease. The majority of the project alignment is in MWAA-controlled property in the median of the Dulles Airport Access Road (DAAR).

MWAA is considering the following capital funding source for the Dulles Corridor Rapid Transit Project:

**Passenger Facility Charges**

In 1990, Congress approved the Aviation Safety and Capacity Expansion Act, which authorized domestic airports to impose a Passenger Facility Charge (PFC) on enplaning passengers. In May 1991, the FAA issued the regulations for the use and reporting of PFCs. PFCs may be used for airport projects that must meet at least one of the following criteria: preserve or enhance safety, security, or capacity of the national air transportation system; reduce noise or mitigate noise impacts resulting from an airport; or furnish opportunities for enhanced competition between or among carriers. MWAA was granted permission to begin collecting a $3 PFC effective November 1, 1993, at National Airport and January 1, 1994, at Dulles Airport. The charges, less an administrative processing fee charged by the airlines, are collected by the airlines and remitted on a monthly basis to MWAA. Due to their restricted use, PFCs are categorized as non-operating revenue and are accounted for on the accrual basis.

The Authority applied for and received the authority in February 2001, to increase the PFC collection from $3.00 to $4.50, effective May 2001. Historically, PFC cashflows do not match the airport construction spending schedule. Therefore, MWAA entered into agreements to provide lines of credit. As of January 1, 2001, MWAA has utilized $170.2 million of a $255 million line of Flexible Term PFC Revenue Notes. The Notes are rated AA-/A-1+ by Standard & Poor's. MWAA expects to redeem all the Notes by November 2005.

Based on the estimates made prior to September 11, 2001, MWAA's PFCs are committed through 2016 for its current expansion program at Dulles Airport. However, MWAA anticipates it may be able to provide its share of capital funding by borrowing against future PFC revenues beyond 2016. FAA approval would be required for any use of MWAA funds towards the project.

#### 8.2.4.5 Loudoun County

Loudoun County is a jurisdictional member of the WMATA Compact District. However, because Loudoun County does not currently receive WMATA service, it does not contribute to the operations or capital budget. The introduction of the Dulles Corridor Rapid Transit Project is anticipated to add Loudon County to the other Virginia jurisdictions contributing to the WMATA budget. Loudoun County does operate its own transit services, and in FY 2002 created the Office of Transportation Services and a Public Transportation Fund to provide resources for its increasing transportation responsibilities.

Loudoun County presently funds the local share of transportation projects through the use of the local gasoline tax and the Business Professional and Occupancy License (BPOL) revenue. On April 1, 2002, the Loudoun County Board of Supervisors approved its FY03 (July 1, 2002 to June 30, 2003) County budget and adopted a six-year Capital Improvement Plan (CIP). The CIP allocates $2.2 million for FY03 from the County Public Transportation Fund to the Dulles Corridor Rapid Transit Project and $61.5 million from BPOL pledge bonds for FY04-08 for the project.

Loudoun County is considering the use of the following capital funding source for the Dulles Corridor Rapid Transit Project:

**BPOL Bonds**

BPOL bonds in the amount of $61.5 million have been programmed for project construction related activities and are anticipated to be available in FY 2004 to 2008. FY09 to FY11 contributions will be addressed in future

Capital Improvement Plans. The County plans to divert BPOL revenues from the General Fund to provide a dedicated source of funding for the project. The loss of BPOL revenues from the General Fund is expected to be compensated through growth in other sources (largely real property taxes) resulting from continued residential and commercial development in the County.

The County currently carries a debt load of $313 million and the Notes are rated by Moody's as AA1, Standard & Poors as AA+ and Fitch as AA+. Despite committing a significant amount of funding to pay-as-you-go project financing, the County's debt load will be increasing over the next few years, due primarily to voter-approved bond initiatives. By the end of FY 2006, the level of outstanding debt is anticipated to be $791 million. County debt service has been held at a relatively constant level over the past two years. The increased debt load is anticipated to increase the debt service obligation from $59 million in FY 2002 to $124 million by FY 2006, not including any debt issued to fund the Dulles Corridor Rapid Transit Project. While the capital sources have been identified by Loudoun County, the specific amounts are placeholders pending agreement on the build alternative, jurisdictional percentages, and schedule.

#### Loudoun County Public Transportation Fund

Funds in the amount of $2.2 million have been programmed for construction-related activities and are anticipated to be available in FY03.

### 8.2.5 FUNDING PLAN

As the project sponsor, DRPT intends to request FTA Section 5309 New Starts funding for 60 percent of the capital costs of the BRT Alternative and 50 percent for the BRT/Metrorail or Metrorail alternatives. The remainder of capital funding will come from the Commonwealth of Virginia, Fairfax County, Loudoun County, MWAA, and potentially private sources. Tables 8.2-7 and 8.2-8 present a summary of the proposed funding by jurisdiction for the Build Alternatives without financing costs. Table 8.2-9 through Table 8.2-12 present a summary of costs with financing included.

**Table 8.2-7: Proposed Capital Cost Funding Allocation by Jurisdiction (millions year-of-expenditure dollars)**

| Proposed Funding Source | BRT | | Metrorail | | BRT/Metrorail | |
|---|---|---|---|---|---|---|
| | Capital Cost | Share | Capital Cost | Share | Capital Cost | Share |
| Federal Sources | $288.9 | 60.0% | $1,551.3 | 50.0% | $769.3 | 52.9% |
| Total Federal Funds | $288.9 | 60.0% | $1,551.3 | 50.0% | $769.3 | 52.9% |
| Non-Federal Sources | | | | | | |
| Commonwealth of Virginia | $96.3 | 20.0% | $774.9 | 25.0% | $342.4 | 23.5% |
| Fairfax County | $75.1 | 15.6% | $499.3 | 16.1% | $323.8 | 22.3% |
| Loudoun County | $14.4 | 3.0% | $148.9 | 4.8% | $12.7 | 0.9% |
| MWAA | $6.7 | 1.4% | $126.9 | 4.1% | $5.9 | 0.4% |
| Total Local Funds | $192.5 | 40.0% | $1,550.0 | 50.0% | $684.8 | 47.1% |
| Total | $481.4 | 100.0% | $3,101.3 | 100.0% | $1,454.1 | 100.0% |

Assumes BRT 1 and Alignment T6.
Capital cost by jurisdiction based on preliminary allocation agreement among non-federal funding partners.
Costs do not include financing costs.

**Table 8.2–8: Proposed Capital Cost Funding Allocation by Jurisdiction – Phased Implementation Alternative (millions year-of-expenditure dollars, excludes finance costs)**

| Proposed Funding Source | BRT | | Metrorail thru Tysons Corner | | Metrorail from Tysons Corner to Loudoun County | | Total | |
|---|---|---|---|---|---|---|---|---|
| | Capital Cost | Share | Capital Cost | Share | Capital Cost | Share | Capital Cost | Share |
| Federal Sources | $288.9 | 60.0% | $525.2 | 50.0% | $881.8 | 50.0% | $1,695.8 | 51.5% |
| Total Federal Funds | $288.9 | 60.0% | $525.2 | 50.0% | $881.8 | 50.0% | $1,695.8 | 51.5% |
| Non-Federal Sources | | | | | | | | |
| Commonwealth of Virginia | $96.3 | 20.0% | $262.6 | 25.0% | $441.2 | 25.0% | $800.0 | 24.3% |
| Fairfax County | $75.1 | 15.6% | $262.6 | 25.0% | $176.4 | 10.0% | $514.1 | 15.6% |
| Loudoun County | $14.4 | 3.0% | -- | 0% | $137.6 | 7.8% | $152.0 | 4.6% |
| MWAA | $6.7 | 1.4% | -- | 0% | $126.8 | 7.2% | $133.5 | 4.0% |
| Total Local Funds | $192.5 | 40.0% | $525.2 | 50.0% | $882.0 | 50.0% | $1,599.6 | 48.5% |
| Total | $481.4 | 100.0% | $1,050.4 | 100.0% | $1,763.8 | 100.0% | $3,295.4 | 100.0% |

Assumes BRT 1 and Alignment T6.
Capital cost by jurisdiction based on preliminary allocation agreement among non-federal funding partners.
Costs do not include financing costs.

The allocation of capital funding presented in Table 8.2-8 reflects the current results of ongoing discussions among the non-Federal funding partners. The share of capital funding proposed for each jurisdiction is approximate, pending the selection of the Locally Preferred Alternative (LPA) and a final cost allocation agreement. The allocation agreement would outline the level and timing of funding required from each jurisdiction, and would be used to support the applications for final design and an FFGA from FTA. Prior to FTA approval of final design and the FFGA, each jurisdiction would be required to take the steps necessary to secure the funding through their respective legislative or administrative processes. This could include legislative appropriations, Board actions, local referenda, and/or administrative approvals.

Under Phased Implementation, the costs per phase are allocated to each jurisdiction based on the timing, cost, and percentage allocation of the phase. Table 8.2-8 presents a summary of the proposed funding by jurisdiction for Phased Implementation of Metrorail.

### 8.2.6 CAPITAL COST AND FINANCING PAYMENT SCHEDULE

A capital cost and financing payment schedule was developed for each Build Alternative to identify the timing of the anticipated payments as discussed below. The payment schedule (excluding financing) presented for each alternative assumes federal construction funding at $200 million annually and does not assign any limits to non-federal sources. As a result, where estimated federal capital expenditures exceed $200 million per year, the project's yearly payment schedule will lag behind the construction schedule presented in Section 8.2.3. The gap is financed through borrowing, and results in federal payments extending beyond the length of the project's opening date.

#### 8.2.6.1 Financing Assumptions and Approach

This section describes the capital cost financing assumptions, approach, and results used in generating the short-term financing and long-term interest required for the Dulles Corridor Rapid Transit Project. A series of financial scenarios are being explored as the project develops. For the purposes of this analysis, local funding jurisdictions are assumed to be able to meet the payment schedule beginning in FY 2003. While recent FTA experience suggests that the annual level of federal funding is lower than the assumptions, the actual federal

participation levels will be determined through negotiations of the FFGA.

Where debt is required, the approach to bonding will greatly impact the project's overall financing charges. For the purposes of this analysis, each year's debt requirement was bonded through the end of the federal payment schedule. No specific state or local agency was identified as the issuer of the debt; that decision will be made as part of the overall agency agreements presently underway. Financing costs for non-federal partners (if required) are not included in this analysis.

The financing cost reflects the need to obtain both short-term financing and long-term debt. Two contracting options are available, the first requires 100 percent funding be available for obligation prior to awarding a construction contract thus the need for short-term financing. To meet this requirement, the project has assumed that a line-of-credit available equal to the remaining project costs throughout the construction contract would be available. An issuance fee of 1 percent and an annual fee of 0.25 percent per year were assumed to cover the short-term financing mechanism. The second approach is to issue construction contracts with cancellation clauses based on the level and availability of funding. This method allows the project to proceed without short term financing, but the construction contract cost would be higher by an amount not readily projected. The long-term debt has been structured as level-payment bonds with 15-year maturities requiring interest-only payments until all the federal funding is received. An issuance expense of 0.8 percent is assumed and the interest rate is based on projections by the DRI-WEFA Bond Buyer Index with a 0.75 percent premium to reflect the likely scenario that the bonds are retired at the completion of federal New Starts funding. (DRI-WEFA is a financial data forecasting service.) Both the structure of the debt financing and the assumptions will affect the eventual interest charges and are still subject to agreement of the funding partners.

### 8.2.6.2 Capital Cost Financing Results

Anticipated short-term financing and long-term interest costs for each Build Alternative were based on the assumptions in Section 8.2.6.1 and the implementation schedule of opening BRT in late 2005, BRT/Metrorail in late 2006, and Metrorail in late 2010. This same schedule was assumed for Phased Implementation except that the years indicated refer to opening year of each phase. Funding partner payments follow the construction schedule phasing within each jurisdiction. BRT 1 and Alignment T6 in Tysons Corner were used to determine the short-term and long-term interest costs for the BRT, Metrorail, BRT/Metrorail, and Phased Implementation alternatives financing results. Allocation of the short and long-term finance costs to each funding partner is based on the proportional average of their construction cost on a year by year basis.

#### BRT Alternative

The short-term financing costs are estimated at $8 million (year-of-expenditure) for BRT 1. No long-term financing resulting from the $200 million federal limit is required. Table 8.2-9 presents a summary of the total anticipated capital cost payment schedule for each funding partner for BRT 1, including financing and interest charges.

**Table 8.2-9: Proposed Capital Cost Payment Schedule – BRT 1 (millions of year-of-expenditure dollars)**

| Funding Partner | Total | FY03 | FY04 | FY05 | FY06 |
|---|---|---|---|---|---|
| FTA (60%) | **$293.7** | $45.8 | $86.2 | $126.1 | $35.6 |
| Virginia (20%) | **$97.9** | $15.2 | $28.8 | $42.0 | $11.9 |
| Fairfax County (15.6%) | **$76.2** | $11.9 | $22.4 | $32.7 | $9.3 |
| Loudoun County (3.0%) | **$14.7** | $2.3 | $4.3 | $6.3 | $1.8 |
| MWAA (1.4%) | **$6.8** | $1.0 | $2.0 | $2.9 | $0.8 |
| Total | **$489.3** | **$76.3** | **$143.6** | **$210.0** | **$59.4** |

Assumes BRT 1.

As a result of the short-term financing costs, the total project cost increases from $481.4 million to $489.4 million for BRT 1, $349.1 million to $357.1 million for BRT 2, and $342.7 million to $350.7 million for BRT 3 in year-of-expenditure dollars.

### Metrorail Alternative

The short-term financing costs are estimated at $51.3 million, and the federal limit results in interest charges estimated at $94.2 million. Combined, the short-term financing and interest costs would increase the total cost of the Metrorail Alternative by $145.5 million (year-of-expenditure).

Table 8.2-10 presents a summary of the total anticipated capital cost payment schedule for each of the funding partners for the Alignment T6, including financing and interest charges.

**Table 8.2-10: Proposed Capital Cost Payment Schedule – Metrorail (millions year-of-expenditure dollars)**

| Funding Partner | Total | FY03 | FY04 | FY05 | FY06 | FY07 | FY08 | FY09 | FY10 | FY11 | FY12 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FTA (50%) | $1,624.1 | $57.3 | $77.9 | $179.0 | $206.1 | $206.1 | $206.1 | $206.1 | $206.1 | $206.1 | $73.2 |
| Virginia (25%) | $811.4 | $28.7 | $38.9 | $89.5 | $122.3 | $90.6 | $127.7 | $171.2 | $124.3 | $18.2 | $0.0 |
| Fairfax County (16.1%) | $522.8 | $28.7 | $38.9 | $89.5 | $105.6 | $54.0 | $59.6 | $79.9 | $58.1 | $8.5 | $0.0 |
| Loudoun County (4.8%) | $155.8 | $0.0 | $0.0 | $0.0 | $9.0 | $19.7 | $36.7 | $49.3 | $35.8 | $5.2 | $0.0 |
| MWAA (4.1%) | $132.8 | $0.0 | $0.0 | $0.0 | $7.6 | $16.9 | $31.3 | $42.0 | $30.6 | $4.5 | $0.0 |
| Total | $3,246.8 | $114.6 | $155.8 | $358.0 | $450.7 | $387.2 | $461.5 | $548.4 | $454.9 | $242.6 | $73.2 |

Assumes Alignment T6.

As a result of the short-term financing and interest costs, the total project cost increases from $2,937.3 million to $3,082.8 million for Alignment T1, $3,101.3 million to $3,246.8 million for Alignment T6, $2,982.6 million to $3,128.1 million for Alignment T9, and $3,080.4 million to $3,225.9 million for Alignment T4 in year-of-expenditure dollars.

### BRT/Metrorail Alternative

The short-term financing costs are estimated at $23.1 and the federal limits results in interest charges estimated at $19.5 million. Combined, the short-term financing and interest costs increase the total cost of the BRT/Metrorail Alternative by $42.6 million (year-of-expenditure). Table 8.2-11 presents a summary of the total anticipated capital cost payment schedule for each of the funding partners for the BRT/Metrorail Alternative, including interest and financing costs.

**Table 8.2-11: Proposed Capital Cost Payment Schedule – BRT/Metrorail (millions year-of-expenditure dollars)**

| Funding Partner | Total | FY03 | FY04 | FY05 | FY06 | FY07 |
|---|---|---|---|---|---|---|
| FTA (52.9%) | $791.9 | $97.4 | $155.0 | $202.7 | $202.7 | $134.2 |
| Virginia (23.5%) | $352.3 | $41.8 | $64.4 | $125.4 | $99.1 | $21.6 |
| Fairfax County (22.3%) | $333.2 | $38.8 | $58.7 | $117.1 | $97.0 | $21.6 |
| Loudoun County (0.9%) | $13.1 | $2.1 | $3.9 | $5.7 | $1.4 | $0.0 |
| MWAA (0.4%) | $6.2 | $0.9 | $1.9 | $2.7 | $0.7 | $0.0 |
| Total | $1,496.7 | $181.0 | $283.9 | $453.5 | $400.9 | $177.5 |

Assumes BRT 1 and Alignment T6.

As a result of the short-term financing and interest costs, the total project cost increases from $1,303.1 million to $1,345.7 million for Alignment T1, $1,454.1 million to $1,496.7 million for Alignment T6, $1,344.7 million to $1,387.3 million for Alignment T9, $1,434.6 million to $1,477.2 million for Alignment T4 in year-of-expenditure dollars. All costs assume BRT 1 for the BRT portion of the alternative.

### Phased Implementation Alternative

The short-term financing costs are estimated at $59.3 million and the federal limit results in interest charges estimated at $120.3 million. Combined, the short-term financing and interest costs increase the total cost of the Phased Implementation Alternative by $179.6 million (year-of-expenditure). Table 8.2-12 presents a summary of the total anticipated capital cost payments for a phased project implementation including interest and financing.

**Table 8.2-12: Proposed Capital Cost Payment Schedule – Phased Implementation (millions year-of-expenditure dollars)**

| Funding Partner | Total | FY03 | FY04 | FY05 | FY06 | FY07 | FY08 | FY09 | FY10 | FY11 | FY12 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FTA (51.5%) | $1,788.0 | $102.5 | $174.9 | $207.3 | $207.3 | $207.3 | $207.3 | $207.3 | $207.3 | $207.3 | $59.4 |
| Virginia (24.3%) | $843.7 | $43.3 | $72.5 | $136.9 | $125.7 | $78.9 | $110.1 | $149.4 | $110.4 | $16.5 | $0.0 |
| Fairfax County (15.6%) | $542.0 | $39.9 | $66.0 | $127.3 | $109.8 | $44.7 | $44.0 | $59.8 | $44.1 | $6.5 | $0.0 |
| Loudoun County (4.6%) | $160.2 | $2.3 | $4.4 | $6.5 | $8.8 | $17.7 | $34.4 | $46.7 | $34.2 | $5.2 | $0.0 |
| MWAA (4.0%) | $141.0 | $1.2 | $2.1 | $3.1 | $7.2 | $16.3 | $31.7 | $43.7 | $31.0 | $4.7 | $0.0 |
| Total | $3,475.0 | $189.2 | $320.0 | $481.1 | $458.7 | $365.0 | $427.5 | $506.9 | $427.0 | $240.2 | $59.4 |

Assumes BRT 1 and Alignment T6.

As a result of the short-term financing and interest costs, the total phased project cost increases from $3,131.4 million to $3,311.0 million for Alignment T1, $3,295.4 million to $3,475.0 million for Alignment T6, $3,176.7 million to $3,356.3 million for Alignment T9, and $3,274.5 million to $3,454.1 million for Alignment T4 in year-of-expenditure dollars. These costs assume BRT 1 is implemented in the initial phase.

## 8.2.7 INNOVATIVE DEBT FINANCING STRATEGIES

In addition to the potential jurisdictional revenue sources previously described, the funding partners are considering innovative debt financing strategies to finance the project capital costs. Innovative debt financing can be used to increase capital revenues and reduce capital costs, thereby improving debt service coverage ratios and increasing financial capacity. As agreement among the funding partners is reached, these strategies will be explored and presented in greater detail in the Financial Plan. The potential financing tools that may be considered for the Dulles Corridor Rapid Transit Project are dependent on the financial market conditions at the time of issuance and include the following.

- **Rail Car Cross-Border Lease.** Off-shore private investors can assume the depreciation costs of rail cars through a cross-border lease. The investors take advantage of home country tax benefits related to depreciation and pass these benefits (typically valued at 5.0 percent of the leased assets) back to the

transit agency. The rail cars must be in WMATA's possession to be considered for rail car cross border lease financing;

- **Financing Vendor Payments.** During the manufacturing and delivery of the rail cars, annual payments to the vendor are financed with short-term debt;
- **Lease Financing.** The financial model assumes that the lease occurs upon completion of delivery and cannot be legally complete until the transit agency holds title to the leased asset. The lease payments are computed as a simple mortgage;
- **Lease Discount.** The private investor depreciation benefit is passed back to the transit agency in the year of the lease transaction (i.e., when the last rail car is delivered);
- **Lease/Leaseback of Transit Assets.** Assets with remaining economic lives of more than 30 years may be financed through a lease/leaseback transaction in which private investors take advantage of depreciation tax benefits and pass some of these benefits back to the transit agency. The magnitude of the lease/leaseback transaction benefit depends on the quantity of eligible assets (e.g. land, buildings, equipment, and rail rolling stock). Other transit agency transactions have included assets with potential alternative commercial uses, such as maintenance and administrative facilities, buildings, land, parking, as well as rail rolling stock. WMATA and the Virginia Railway Express have successfully used this technique. Dulles Corridor Rapid Transit Project buses, rail cars and facilities could be financed under this strategy, yielding up to $60 million. A drawback of this approach is that once implemented, no federal funding can be utilized for the maintenance of the asset;
- **Refinancing Future Debt.** Extending the maturity of projected future debt provides an opportunity to reduce future annual debt service and increase debt coverage ratios. The financial analysis assumed that every series of conventional bonds would be callable in the eleventh year after issue with a premium of 2.0 percent on the outstanding debt;
- **Public-Private Virginia's Partnership.** The Dulles Corridor Rapid Transit Project is well positioned to take advantage of the Commonwealth of Virginia's Public-Private Transportation Act procurement opportunity. A private consortium has proposed to design, and build a high-capacity transit system in the Dulles Corridor. The private consortium has the capability to provide significant equity and cash savings to the project through innovative financing techniques.

## 8.3 OPERATING FUNDING PLAN

WMATA is assumed to be the operator of BRT improvements, and would be the operator of the Metrorail extension. As project planning and engineering design continues, DRPT will work closely with WMATA to continually develop and finalize the operating plan that will present the operating revenues and costs for the Build Alternatives. At this time, the operating plan for the Dulles Corridor Rapid Transit Project consists of the following components that vary among the Build Alternatives:

- Proposed BRT and Metrorail services funded under the WMATA Compact and operating along the DAAR and Dulles Connector Road;
- Existing and expanded local and express bus services operating in the corridor as feeders to the proposed BRT and Metrorail alternatives. The bus services include existing services operated by Fairfax and Loudoun counties, and WMATA.

### 8.3.1 OPERATING AND MAINTENANCE COSTS

O&M costs for the opening year and forecast year (2025) were developed for BRT, Metrorail, Fairfax County bus operations, Loudoun County Commuter Service bus operations, and WMATA bus operations.

BRT and Metrorail costs were developed using the WMATA O&M cost model updated and recalibrated with WMATA FY 2002 data. The model is structured to estimate costs in five categories: joint expenses, facilities maintenance, traction power, Metrobus and Metrorail operations. BRT operations were further adjusted according to the type of station/stop served. The BRT and Metrorail operation and maintenance costs represent the new service contained within one of the Build Alternatives. Annual O&M estimates are inflated to year-of-expenditure dollars using consumer price index projections from DRI-WEFA.

Fairfax County Connector, Loudoun County Commuter Service, and Metrobus O&M baseline costs were based on cost per revenue-hour provided by the agencies. The overall operating cost was determined by multiplying the revenue hours of operation by the cost per revenue hour.

Incremental changes in O&M costs for each jurisdiction are presented in Section 8.3.3. The *Transit Operations & Maintenance Plan Technical Report* (June 2002) provides the complete methodology used in determining the operating costs.

### 8.3.2 OPERATING REVENUES

Operating revenues would come from a number of sources including:

- **Passenger Fares.** Estimated fare revenues for the BRT and Metrorail alternatives are based on the additional ridership travel demand estimates and the fare revenue generated by the project. The impacts of fare increases on projected ridership are included, adjusted for fare elasticity. The existing Metrorail fare structure and distance-based charges were used with fares inflated at a rate equal to one-third the consumer price index adjusted in every third year beginning in FY 2004. No other changes to the existing WMATA fare structure were assumed, including no adjustment to the current taper and maximum fare limit structure. Subsidies resulting from the fare limits are assigned equally to the local jurisdiction and system.
- **Parking.** Projected parking revenues are estimated based on the systemwide average percentage for collected parking fees. For WMATA facilities, parking fees are determined with the agreement of the jurisdiction in which the station is located. Fees are based on historic parking lot use and local government objectives regarding station area traffic volumes. Local governments have funded construction of additional structured parking at Metrorail stations with the revenues shared between WMATA and the local government.
- **Joint Development.** Joint development includes potential air rights development above transit stations and facilities and connections to development on adjacent properties. Future projections will be based on development opportunities identified during the design process and in the stakeholder outreach, including major property owners and real estate developers in the Dulles Corridor.
- **Advertising.** Revenues are generated from advertising on vehicles and in stations and are generally based on contract rates negotiated with national advertising firms.
- **Concessions.** Concession revenue includes income from telephones, fiber optic, and potentially from retail operations within stations and facilities.

Other funds under consideration include the following sources:

- **Section 5307 Urbanized Area Formula Funds.** Section 5307 grants are for preventative maintenance activities for assets classified as capital in an operating budget. A conservative approach was taken in the analysis and these funds were not assumed in the subsidy analysis;
- **DRPT Formula Subprogram.** DRPT administers a formula assistance program to local transit operators throughout the Commonwealth. The program has increased 6 to 8 percent annually since 1997, reaching $76.8 million in FY 2001. The Northern Virginia Transportation Commission annually receives at least 60 percent of total program funds, which it passes through to Northern Virginia jurisdictions to support local transit operating needs;

### 8.3.3 PROJECTED SUBSIDY ALLOCATION

WMATA Compact member jurisdictions contribute to the agency's annual operating budget in accordance with Board-approved allocation formulas that reflect ridership and service levels for Metrobus and Metrorail service. The member jurisdiction's contribution to WMATA's FY 2002 operating budget for Metrobus, ~~and~~ Metrorail, and Metroaccess is $359.8 million.

The basis for funding operating deficits for extensions to the existing Metrorail system, such as the proposed Dulles Corridor Rapid Transit Project, is stated in the WMATA Board of Directors Resolution #2000-35, dated May 25, 2000:

> "The operating deficit of an Extension will be allocated among all the Compact member jurisdictions in accordance with the formula in effect for the funding of the Metrorail operating deficit in the years that such deficit occurs."

Two allocation formulas are used to determine the subsidy for each jurisdiction: the Metrorail subsidy allocation formula and the max-fare subsidy formula.

Each signatory's share of the Metrorail subsidy is determined using the current Metrorail subsidy allocation formula, which is based on:

- One-third of the **relative number of stations** in operation in each jurisdiction.
- One-third of the subsidy is distributed on the basis of a **weighted average of urbanized area population and population density** using 1990 census data and the 1990 census population definition of the urbanized area. When 2000 census data is available, this information will be updated.
- One-third of the subsidy is distributed on the basis of the **weekday Metrorail passengers by jurisdiction of residence.**

The max-fare subsidy is one-half the revenue differential between what riders traveling more than six composite miles actually pay and what they would have paid without a tapered mileage charge or a fare limit. The allocation of this subsidy by jurisdiction is determined from the Metrorail passenger survey. The charge to each jurisdiction reflects the residence of the riders receiving the benefit of the reduced regular fares and the value of the benefit received. The estimated amount of the max-fare subsidy for FY 2001 is $3,196,700 (less than one percent of the operating budget). The results presented in this section have been allocated by the Metrorail subsidy formula. The Metrorail subsidy formula was also used to calculate the BRT operating subsidy.

The systemwide revenues from fares and the other operating revenue previously described are subtracted from systemwide costs to yield the operating subsidy for WMATA Compact member jurisdictions. The WMATA Compact subsidy allocation is based on the Metrorail Subsidy Allocation Formula.

Tables 8.3-1 and 8.3-2 present incremental changes to the O&M costs, revenue, and subsidy allocation to WMATA Compact member jurisdictions for the Build Alternatives. Opening year and forecast year results are provided for comparison. The costs, revenue, and subsidy of the BRT elements are provided to indicate that BRT has a high subsidy level—$12.6 million per year—if operated independently of WMATA. In this case, the Metrorail subsidy allocation would not apply.

**Table 8.3-1: Opening Year – Compact Members Incremental Subsidy Requirements for Metrorail and BRT Operations (millions year-of-expenditures dollars)**

| | Opening Year | | | | |
|---|---|---|---|---|---|
| | BRT (2006) | | Metrorail and Phased Implementation (2010) | BRT/Metrorail (2006) | |
| | BRT | Total = BRT + Rail | | BRT | Total = BRT + Rail |
| Total Project O&M Costs | $20.2 | $20.7 | $108.3 | $16.5 | $53.7 |
| Project Operating Revenue | $7.6 | $15.4 | $42.3 | $6.6 | $28.8 |
| WMATA Compact Subsidy | | | | | |
| District of Columbia | | ($2.5) | $14.9 | | $3.1 |
| Virginia[1] | | $9.5 | $37.0 | | $18.3 |
| Alexandria | | ($0.3) | $2.2 | | $0.5 |
| Arlington County | | ($0.5) | $4.4 | | $1.2 |
| Fairfax City | | $0.0 | $0.1 | | $0.1 |
| Fairfax County | | $4.6 | $19.8 | | $10.1 |
| Falls Church | | $0.0 | $0.1 | | $0.0 |
| Loudoun County | | $5.9 | $10.4 | | $6.6 |
| Maryland[1] | | ($1.7) | $14.1 | | $3.5 |
| Montgomery County | | ($0.8) | $7.2 | | $1.9 |
| Prince George's County | | ($0.9) | $6.9 | | $1.6 |
| Total Project Subsidy | $12.6 | $5.3 | $66.0 | $9.9 | $24.9 |

1 Internal totals may not tally precisely due to rounding.
BRT Alternative year of analysis is 2006 and opening year is 2005.
Operating subsidies distributed to Virginia jurisdictions are supported with state formula assistance.
Assumes BRT 1 and Alignment T6.

Local bus transit services provided by Fairfax County, Loudoun County, and WMATA are not subject to the WMATA Compact Metrorail Subsidy Allocation Formula. The existing transit service may potentially be affected as a result of the new service. The following changes are estimated in the forecast year 2025, using FY 2001 dollars. For Fairfax County, the estimated changes resulting from the reassigned bus routes varies from an increase of $400,000 per year for BRT, to a decrease of $2,900,000 per year for BRT/Metrorail and Metrorail. Likewise, Loudoun County is estimated to potentially reduce its Commuter Bus transit service by approximately $300,000 per year under each Build Alternative. Potential savings to WMATA Metrobus varies from $800,000 per year for BRT to $1,200,000 per year for BRT/Metrorail and Metrorail.

**Table 8.3-2: Forecast Year (2025) - Compact Members Incremental Subsidy Requirements for Metrorail and BRT Operations (millions year-of-expenditure dollars)**

| | Forecast year (2025) | | | | |
|---|---|---|---|---|---|
| | BRT | | Metrorail and Phased Implementation (2010) | BRT/Metrorail | |
| | BRT | Total = BRT + Rail | | BRT | Total = BRT + Rail |
| Total Project O&M Costs | $51.7 | $54.1 | $179.4 | $39.6 | $107.6 |
| Project Operating Revenue | $18.8 | $37.4 | $68.3 | $15.8 | $56.2 |
| WMATA Compact Subsidy | | | | | |
| District of Columbia | | ($8.1) | $19.7 | | $1.0 |
| Virginia[1] | | $30.7 | $72.6 | | $48.1 |
| Alexandria | | ($0.9) | $3.0 | | $0.5 |
| Arlington County | | ($2.0) | $5.7 | | $0.7 |
| Fairfax City | | $0.0 | $0.2 | | $0.1 |
| Fairfax County | | $13.5 | $38.5 | | $25.9 |
| Falls Church | | $0.0 | $0.1 | | $0.1 |
| Loudoun County | | $20.1 | $24.8 | | $20.8 |
| Maryland[1] | | ($6.0) | $18.8 | | $2.3 |
| Montgomery County | | ($2.8) | $9.9 | | $1.5 |
| Prince George's County | | ($3.2) | $8.9 | | $0.8 |
| Total Project Subsidy | $32.9 | $16.7 | $111.1 | $23.8 | $51.4 |

1 Internal totals may not tally precisely due to rounding.
Operating subsidies distributed to Virginia jurisdictions are supported with state formula assistance.
Assumes BRT 1 and Alignment T6.

## 8.4 RISKS AND UNCERTAINTIES

Although the financial analysis defines a proposed funding scenario based on reasonable funding, financing and cost assumptions, there are a number of risks that could influence the stability of the project's financial plan, including construction cost risk and operating cost risk.

### 8.4.1 CONSTRUCTION COST AND REVENUE RISK

Differences between projected and actual construction costs may occur because of unforeseen conditions, variations in construction unit cost, bid quantities, changes in design elements, mitigation of environmental impacts, or special security measures that may be required for transit facilities. Some of the conditions that may affect actual construction costs include the following:

- **Construction Costs.** Differences in construction costs may occur because of changes in technology requirements; unforeseen conditions such as soil and utility relocations; and changes in design elements.
- **Real Inflation.** The rate of inflation may vary, significantly affecting the base unit costs.
- **Dedicated Revenues.** Variations in dedicated revenues from participating jurisdictions may affect the ability to cover debt and fund capital requirements.
- **Schedule.** Delays in the construction schedule may increase the overall project cost and extend the inflation risk.

- **Capital Funding Availability.** The availability of capital funds from federal, state and local jurisdictions affects the timing and overall cost of the project. Delays may result in additional bonding requirements or schedule adjustments.
- **Interest Rates.** Variations in interest rates impact the long-term debt service payments.
- **Financing Approach.** There are many variations to the debt issuance requirements, including some that are market driven. Who issues the debt, with what terms, may change the project's financing costs.

### 8.4.2 OPERATING COST AND REVENUE RISK

Differences between projected and actual bus and rail operating costs may impact the anticipated subsidy requirements to address the gap between revenue and expenses. Some of the conditions that may affect actual operating costs include the following:

- **Fares, Fare Policy and Cost Recovery.** Changes in fare levels and structures affect ridership, fare revenue and cost recovery. Changes in ridership affect the level of service required which affects capital and operating costs.
- **Service Levels.** The frequency of service and hours of operation affect ridership, fare revenue, capital and operating costs.

There are several methods that the project team could use to address these risks, should they occur. These strategies include modifying the scope, timing and schedule implementation of the project; including construction cost contingency amounts in the capital cost estimates; adjusting fares; establishing short-term letters-of-credit; and modifying the issuance of long term debt.

# Secondary and Cumulative Effects 9

# 9 SECONDARY AND CUMULATIVE EFFECTS

The Council of Environmental Quality's (CEQ's) regulations implementing the National Environmental Policy Act (NEPA) divide environmental impacts into three categories: direct impacts, indirect or secondary impacts, and cumulative impacts. The regulations require that all three types of impacts be included in NEPA documents. Direct impacts are discussed throughout the Draft Environmental Impact Statement (EIS).

CEQ regulations require consideration of indirect (or secondary impacts), which is caused by the proposed action, but which are "later in time

or further in distance" than the direct impacts discussed elsewhere in the document (40 CFR 1508.8). Indirect effects could include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air, water, natural systems, or the human environment.

CEQ regulations also require that federal agencies preparing an environmental impact statement consider the cumulative effects of a proposed action and other actions. CEQ defines cumulative effects as an "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions." CEQ's publication, *Considering Cumulative Effects Under the National Environmental Policy Act* (January 1997), provides a framework for addressing cumulative effects. This handbook outlines general principles about how to evaluate cumulative effects. It does not represent new legal requirements nor is it legally binding; rather, it clarifies a complex area of the NEPA process.

The analysis in this section focuses on three primary areas of concern:

- Determining the secondary effects associated with construction of the Build Alternatives and the induced development (also referred to in this Draft EIS as secondary development) that would be allowed at the transit station areas;
- Describing the potential cumulative effects that would occur due to construction of the Build Alternatives in addition to past, present and future reasonably foreseeable projects described in the baseline condition in Chapter 2; and
- Suggesting mitigation measures that could reduce the potential for secondary and/or cumulative effects.

The following items are discussed in this chapter.

**Section 9.1 General Methodology.** This section presents a discussion of the basic steps used in evaluating Secondary and Cumulative Effects and presents a list of projects considered in the evaluation. Methodologies are discussed in more detail in Sections 9.3 and 9.4.

**Section 9.2 Resource Identification.** All resources are not susceptible to secondary and/or cumulative effects. This section presents the list of resources included in this evaluation.

**Section 9.3 Secondary Development Effects.** This section presents information on the potential secondary development effects, focusing specifically on the effects of the increase in densities that are proposed in the transit station areas.

**Section 9.4 Cumulative Effects.** The Cumulative Effects section includes an analysis of the potential effects of past, present, and future reasonably foreseeable projects.

**Section 9.5 Mitigation.** Several mitigation proposals are included in this section.

## 9.1 GENERAL METHODOLOGY

The process used to evaluate secondary and cumulative effects is based on CEQ regulations. It involves the following basic steps:

1) Identify sensitive resources and area of effect.
2) Identify sources of potential secondary and cumulative effects on resources.
3) Identify potential effects.

Each of these steps is introduced briefly in the following sections.

### 9.1.1 IDENTIFY SENSITIVE RESOURCES AND AREA OF EFFECT

The first step in the process is the identification of sensitive resources to be analyzed for effects. These resources would include: those that are directly affected by the Build Alternatives, those affected by the secondary development that is associated with the stations under consideration, and those resources that are particularly susceptible to cumulative effects (e.g. wetlands can experience multiple individual impacts from many projects over time, that when summed result in cumulative effects). Not all impacts tend to "accumulate"—that is, similar impacts from more than one project do not tend to add together and create a greater impact. Some resources may experience project impacts that result in minimal change, but when impacts from several actions are summed cumulatively, they may experience cumulative effects over time.

Sensitive resources were identified using the environmental information prepared for the various sections of the Draft EIS, as well as public and agency scoping comments received. In addition, the agencies shown in Table 9.1-1 were contacted to request information regarding sensitive resources and other major actions that should be considered in determining cumulative effects.

After the sensitive resources were identified, a composite map of the resources was prepared to determine an overall geographic boundary for the analysis. This methodology to determine a unified geographic boundary is consistent with secondary and cumulative effects analyses being conducted in other states (e.g., Maryland).

The study area for the cumulative effects analysis was based on a combination of factors. Within Fairfax County, the corridor boundary, which was largely based on the traffic area of influence, was used. Fairfax County is currently highly developed and cumulative impacts are more likely to depend on the traffic area of influence. The corridor boundary was drawn to include the greatest number of trips that would be drawn to the new transit improvements. In Loudoun County, this area was altered to follow the various watershed boundaries of the streams that traverse the Dulles Corridor. These boundaries were used because of the

**Table 9.1-1: Agencies Contacted for Secondary and Cumulative Effects Analysis**

| **Federal Agencies** | **State Agencies (Continued)** |
|---|---|
| Federal Aviation Administration,<br>Office of Airports Planning & Programming | Virginia Department of Historic Resources,<br>Northern Regional Preservation Office |
| Federal Aviation Administration,<br>Washington Airports District Office | Virginia Department of Game and<br>Inland Fisheries |
| National Marine Fisheries Service, Northeast Region<br>Public Affairs Office | Virginia Department of Historic Resources,<br>State Historic Preservation Office |
| National Park Service, National Capital Region | Virginia Department of Transportation |
| National Park Service, Wolf Trap Farm Park | Virginia Marine Resources Commission |
| Smithsonian's National Air and Space Museum | Virginia Outdoors Foundation |
| U.S. Army Corps of Engineers, Norfolk District | **County Agencies** |
| U.S. Army Corps of Engineers, N. VA Field Office | Fairfax County Executive |
| U.S. Army Corps of Engineers, N. VA Reg. Section | Fairfax County Department of Transportation |
| U.S. Department of Agriculture, NRCS | Fairfax County Economic Development Authority |
| U.S. Department of Agriculture, VA Conservationist | Fairfax County Community & Recreation Services |
| U.S. Environmental Protection Agency | Fairfax County Park Authority |
| U.S. Fish & Wildlife Service, Virginia Field Office | Fairfax County Planning and Zoning |
| **Regional Agencies** | Fairfax County Public Works & Environmental Services |
| National Capital Planning Commission | Fairfax County Water Authority |
| Northern Virginia Regional Commission | Loudoun County Building & Development |
| Metropolitan Washington Airports Authority, Planning | Loudoun County Administrator |
| Metropolitan Washington Airports Authority, President | Loudoun County Parks & Recreation |
| Metropolitan Washington Council of Governments | Loudoun County Transportation Planning Program |
| Northern Virginia Regional Park Authority | Loudoun County Planning |
| Northern Virginia Soil and Water Conservation District | **Local Agencies** |
| **State Agencies** | City of Falls Church, Planning Department |
| Virginia Department of Aviation | City of Falls Church, City Manager |
| Virginia Department of Environmental Quality | Dulles Greenway, Director of Operations |
| Virginia Department of Forestry | Town of Herndon, Community Development |

differences within the Dulles Corridor between the two counties. Loudoun County is more rural in character and cumulative effects would be more likely to involve natural resources. Therefore, the watershed boundaries were used to define the study area. Figure 9.1-1 presents the study area for the cumulative effects and secondary effects analyses. The timeframe for the analysis is the future design year, 2025.

### 9.1.2 IDENTIFY POTENTIAL SOURCES OF EFFECTS

By definition, the sources of cumulative effects are the Dulles Corridor Rapid Transit Project and the other actions proposed within the project's area of influence. These actions, which are included as part of the Baseline Alternative, are listed in Table 9.1-2.

For the Dulles Corridor Rapid Transit Project, the primary source of potential secondary effects is the increased development allowed in the station areas for the Build Alternatives. Though the addition of transit does not directly cause the development to occur, county comprehensive plans have been modified to ensure that new development is located in the vicinity of stations if a new transit line is built. This induced increase in

**Table 9.1-2: Other Projects Included in the Cumulative Effects Analysis**

| Project | Description |
|---|---|
| **Transit Projects (Included in Baseline Alternative)** | |
| New Bus Access Slip Ramps on DAAR and Dulles Toll Road | Construction of four new bus-only, at-grade slip ramps to allow for bus access between the DAAR and Dulles Toll Road and to improve safety and schedule reliability. The new ramps would begin operation by 2002. |
| Enhancements to Fairfax County Dulles Corridor Express Bus Service | Fairfax County would increase bus service in the Dulles Corridor in 2002. Service enhancements include improved peak and midday headways for Reston circulator services and an increase in peak-period service from Reston to the Tysons-West*Park Transit Station and the West Falls Church Metrorail Station. |
| New Loudoun County Express Bus Service | Loudoun County added new express bus routes to its existing service in 2001, connecting various points in the county and Washington, D.C. All of the Loudoun County routes (new and existing) will include stops at the Dulles North Transit Center, and some routes would include intermediate stops at Herndon-Monroe and Reston Town Center. Connections to the Metrorail system would be made at the Rosslyn Station. |
| Expansion of Reston East Park-and-Ride | Fairfax County has studied alternatives designed to expand the Reston East Park-and-Ride to include a multi-level garage with 2,300 spaces by 2010 |
| **Highway Projects (Included in Baseline Alternative)** | |
| Route 123 | Roadway widening from Route 7 to I-495 (from six to eight lanes; estimated completion by 2010). |
| DAAR Widening | From Dulles Airport to Route 123; widen from four to six lanes; estimated completion 2010; not in TIP. |
| I-495 | Capacity improvements, including HOV lanes, are planned for I-495 between the I-395/I-495/I-95 interchange and the American Legion Bridge, including ramps providing direct HOV access to Tysons Corner at Route 123. Implementation of these improvements is anticipated by 2010. |
| Route 7 | Route 7 within Tysons Corner is planned for expansion from six to eight lanes by 2010. Route 7 is also planned for expansion from four to six lanes between Reston Parkway and the Dulles Toll Road, and Rolling Holly Drive and Reston Parkway. |
| Dulles Greenway | A third lane in the eastbound direction between Route 772 and the mainline toll plaza opened in December 2000. Construction of a third westbound lane is expected to be completed by 2003. |
| Route 7100 | Route 7100 is planned for expansion from four to six lanes between I-66 and Sunrise Valley Drive by 2010. |
| Route 50 | A segment of Route 50 between Old Lee Road and the Fairfax/Loudoun county border is planned for expansion from four to six lanes by 2020. |
| Route 28 Improvements | Design/Build project to widen from six to eight/ten lanes; add interchanges; complete 2005; from I-66 to Route 7; project proposed for 2001 CLRP and 2002-2007 TIP; addition of light rail also possible. |
| Loudoun County Parkway | This is a two- to four-lane, north-south roadway, which will link the Dulles Greenway and Route 7, and be widened to a four- to six-lane facility, by 2010. |
| **Other Projects (Other Actions not Transportation Related)** | |
| Wolf Trap Master Plan Improvements | Expanded and improved parking and circulation improvements at the park. |
| Dulles Airport Master Plan Improvements | Planned improvements underway or pending: 2 new garages, land- and air-side trains, new concourse(s), and new runway. |
| Smithsonian Air and Space Museum Dulles Airport Expansion | Museum expansion on south end of Dulles Airport property. Construction underway, with an estimated completion December 2003. |


LEGEND

Cumulative Effects Study Boundary

County Boundary

Figure 9.1-1

## Cumulative Effects Study Area

Dulles Corridor Rapid Transit Project

development has the potential to have effects on social, environmental, and transportation conditions beyond those directly associated with the proposed project.

During the public scoping process for the project, the potential for secondary effects due to increases in the allowable density of development were of primary concern to local citizens. Commenters consistently requested an analysis of the effects the increased density would have on traffic congestion and their quality of life. Fairfax County officials also requested an analysis of the effects of increases in allowable densities.

There are a variety of other potential transportation projects within the study area for secondary and cumulative effects that are in the initial planning phase. These projects would include major transportation projects such as the I-66 Widening and Metrorail Orange Line expansion project, the Western Transportation Corridor Study, the Capital Beltway Rail Feasibility Study, and other initiatives. In addition, there are local improvements contained in the comprehensive plans of Fairfax and Loudoun counties such as the construction of the Edmund Haley Tunnel and Rocky Run Road in Fairfax County. Since these projects are in the initial stages of planning and no information is available as to their likely construction or impacts, they are not considered to be reasonably foreseeable for this project.

### 9.1.3 IDENTIFY POTENTIAL EFFECTS

The final steps in the secondary and cumulative effects analysis process involve actually determining the effects the potential sources have on the identified resources.

For secondary effects, this effort included a new transportation demand analysis for the corridor, which was based on the anticipated increases in development. The previous transportation demand analysis used the regionally approved forecasts of future growth (as required by federal regulations), which do not reflect the maximum allowable level of development in the counties or account for the shifting of dense development to proposed station vicinities.

For the assessment of cumulative effects, the projects identified in Table 6-2 were evaluated relative to the same social, environmental, economic, and transportation criteria presented in the Draft EIS, though at a lower level of detail. The mitigated condition for the evaluated projects was assumed for the analysis. The anticipated effects of these projects were combined with identified impacts of the Dulles Corridor Rapid Transit Project to determine the potential for cumulative effects.

The results of these effects analyses are presented in subsequent sections.

## 9.2 RESOURCE IDENTIFICATION

The following resources were identified as sensitive to secondary effects:

- Neighborhoods, Community Services, and Cohesion
- Displacements
- Visual and Aesthetic Conditions
- Cultural Resources
- Parks and Recreation Resources
- Geologic Resources

- Water Resources
- Aquatic Biota and Habitat
- Terrestrial Biota and Habitat
- Rare, Threatened and Endangered Species
- Traffic and associated Air Quality Impacts

Most of these resources were also assessed for cumulative effects. However, if a proposed project does not result in an impact to a certain resource, then it will not contribute to cumulative impacts to that resource. The Dulles Corridor Rapid Transit Project would not result in impacts to environmental justice populations, air quality, or energy as discussed in the individual sections of this Draft EIS, even though these resources are sensitive to cumulative effects. Therefore, they are not included in this evaluation.

## 9.3 SECONDARY DEVELOPMENT EFFECTS

Secondary development effects are impacts related to the increased density of development that would occur because local jurisdictions have plans in place that allow for greater density in some areas if transit is provided. An assessment of these effects is included in the Draft EIS at the request of local citizens and jurisdictions. As noted earlier, the provision of transit within the corridor does not, in and of itself, cause secondary development to occur. However, because language in the county comprehensive plans allows more density to occur at transit station areas only if transit is constructed, it is considered induced or secondary development for the purposes of this analysis.

The allowable transit-related growth will result in an increase in development in the immediate vicinity of stations throughout the corridor, but does not represent a dramatic increase over the overall level of growth allowed in Fairfax and Loudoun counties, as defined in their land use regulations. Rather, the comprehensive plans refocus the previously anticipated levels of growth into patterns that will increase the number of viable travel options available to corridor residents and employees, including transit, walking, and bicycling. As an additional benefit, compact development reduces the cost of providing utilities, facilities, and services to new residential and commercial developments. The former, dispersed pattern of development would have been highly auto-oriented, leaving people with few travel choices and resulting in wide-spread congestion. While it is expected that increased density will result in localized traffic congestion in station areas, the new, transit-oriented urban form will help to increase overall mobility in the corridor, the counties, and the region.

As discussed in Chapter 5, the real estate evaluation conducted by the project team indicates that market conditions in the corridor will support new development in each of the station areas. Even without the mobility benefits associated with the provision of rapid transit improvements, the corridor is projected to absorb high levels of development under the Baseline Alternative. Depending on the alternative selected, the introduction of transit service and application of associated density bonuses increases the level of development corridor-wide by approximately 6 million to 43 million square feet, due to positive real estate development trends that are expected to continue. The worst-case scenario—that is, the highest potential increase in development—is associated with Metrorail Alterative, and represents a 14 percent increase over the 305 million square feet projected under the Baseline Alternative. Most of this new development is residential in form and the highest concentrations are forecast for Tysons Corner and at the Route 28 station area, although new residential development is projected at every station area except Route 606.

The anticipated effects of the transit-related growth are discussed in the following sections for each of the Build Alternatives. Anticipated development levels under the Baseline Alternative are presented for comparison.

## 9.3.1 METHODOLOGY

Evaluating secondary development effects involved first determining the extent of the anticipated transit-related growth, then evaluating the effects of this growth via a combination of quantitative and qualitative methods.

### 9.3.1.1 Determine Extent of Transit-Related Growth

The character and extent of the anticipated growth in station areas were described earlier in Chapters 3 and 5. Development increases were primarily determined on a parcel-by-parcel basis, following the guidelines in the Fairfax and Loudoun county comprehensive plans. Development estimates for an individual parcel were subject to a number of considerations, including parcel size, location, ownership, and visibility, as well as site access and environmental constraints. For some locations, it is anticipated that development will occur at the maximum allowable level; however, the overall corridor projections still allow for additional growth in some areas beyond the time frame of this project.

In some areas that are already developed, it may not be economically viable to redevelop at the higher densities, especially if the density is only slightly below the maximum allowed or if the development is fairly recent. Accordingly, parcels were evaluated with an eye towards areas that would provide the potential for infill, joint development, or redevelopment. For each parcel, an estimated percentage of build-out is presented (50 percent, 70 percent, 100 percent). Then, the acreage by density allowed under the *Fairfax County Comprehensive Plan* and the mix of uses permitted is calculated and multiplied by the percentage of estimated development to determine the amount of growth that would likely occur. For Loudoun County, detailed parcel information was not provided, so the build-out percentage was applied to the area defined as the Transit-Related Employment Center (TREC) and the Transit-Oriented Development (TOD) in the *Loudoun County Revised General Plan*.

The projections of future land development would be greatly influenced by factors outside of the control of the project proponent. Such factors as the economy, changes in land use plans by the local jurisdictions, and technological trends can all affect how, when, and to what degree land is developed. The levels of growth projected vary by alternative, with the highest level of growth projected to occur under the Metrorail Alternative (specifically Alignment T4, with six stations in Tysons Corner). The growth projections can be considered to be aggressive overall, with high levels of infill development and redevelopment, especially on land that is directly adjacent to the transit station platforms. Although the projections never attain full build-out for the entire corridor, many of the individual parcels are projected to be developed at the full intensity allowed in adopted plans. These aggressive estimates likely represent a worse-case scenario for secondary impacts, based on information known at this time. Actual growth may be less than that projected as part of this analysis.

### 9.3.1.2 Determine Effects of Transit-Related Growth

Following the determination of how much growth would occur—including development, population, and employment—the impacts of this growth were analyzed in much the same way that the direct impacts of the project were analyzed. Study areas were defined around each proposed station location. The size of these study areas varied depending upon where density bonuses were allowed by the local jurisdictions: 1,600 feet radius for the Tysons Corner area, one-half mile radius for Fairfax County (but not within the Town of Herndon where there are no density bonuses at this time), and one-half mile radius for Loudoun County. No assessment

of secondary development impacts was undertaken for the West Falls Church or Dulles Airport station areas because no density bonuses are allowed in these areas. Outside of station areas and along regional transportation facilities, the expected effects of secondary development were assessed qualitatively.

To determine potential traffic effects, the revised population and employment projections for station areas in Fairfax County were used to conduct a new series of travel demand analyses for 2025. Parcel-specific data for Tysons Corner and the Mid-Corridor area were aggregated to a more refined geographic data structure developed by Fairfax County, allowing a much more detailed analysis than is possible with the land use data structure developed by the Metropolitan Washington Council of Governments (MWCOG). Station areas in Loudoun County were not included in these new analyses because the detailed, parcel-specific land use data and refined geographic data structure (similar to that provided by Fairfax County) were not available from Loudoun County. Consequently, conducting analyses that included growth at Loudoun County station areas would have required a much more substantial effort. As Loudoun County advances their land use planning efforts around the Route 606 and Route 772 stations (including the identification of committed roadway improvements), subsequent analyses of secondary travel effects could be expanded to include these areas.

It should be noted that Loudoun County travel patterns would still be affected by transit-related development growth in Fairfax County. For example, increased employment densities around Fairfax County stations are forecast to attract more Loudoun County residents working in Fairfax County; conversely increased station-area residential densities in Tysons Corner and the Mid-Corridor area would result in more trips to Loudoun County employment (and other) destinations.

The evaluation of effects on other sensitive resources was not as technically involved as the traffic analysis, because only general information is known regarding the location, scale, and appearance of the projected development. For example, it is difficult to conduct an in depth analysis of visual effects associated with the new development when specific designs and plans are not available. However, knowing the anticipated density and scale of development, and the relatively confined area in which it is allowed, a general assessment of its visual effects could be conducted. The same methodology applies to other resources as well.

### 9.3.2 BASELINE ALTERNATIVE

To analyze the secondary effects, it is first necessary to establish what the future existing condition would be without the any of the proposed Build Alternatives, i.e. the Baseline Alternative.

Table 9.3-1 shows the predicted development characteristics if none of the Build Alternatives were implemented. It should be noted again that the predicted character of development is highly speculative. It represents how development would occur under circumstances similar to today—policies that are applicable today, growth rates based on what is known today, and market influences that are in force today—although it is very unlikely that all of these conditions would continue unchanged until 2025. Therefore, the predicted growth presented in this analysis is useful mostly for comparative purposes and should not be considered as the actual future population, employment, and land use that would occur in 2025.

As discussed in Chapter 5, the baseline estimates are based on the regional projections from MWCOG's Round 6.2 model. In some cases, the MWCOG projections do not accurately reflect existing levels of development, which is common when a regional model is used for such detailed analyses. Accordingly, the population, employment, and land use projections for the Baseline Alternative in 2025 are regional estimates that have been adjusted to be consistent with the verified levels of development already existing in the corridor.

**Table 9.3-1: Population, Employment, and Land Use – Baseline Alternative (2025)**

| Station Area | Station Area Size | Population | Employment | Land use (square feet)* | |
|---|---|---|---|---|---|
| **Tysons Corner Alignment T1** | 1,600 feet radius around 3 stations | 4,395 | 48,036 | Residential<br>Commercial | 2,197,500<br>16,720,150 |
| **Tysons Corner Alignment T6/T9** | 1,600 feet radius around 4 stations | 4,904 | 61,883 | Residential<br>Commercial | 2,452,000<br>21,106,150 |
| **Tysons Corner Alignment T4** | 1,600 feet radius around 6 stations | 10,938 | 84,670 | Residential<br>Commercial | 5,469,000<br>28,019,350 |
| **Wiehle Avenue** | ½ mile radius | 755 | 16,910 | Residential<br>Commercial | 521,437<br>5,257,992 |
| **Reston Parkway** | ½ mile radius | 2,682 | 25,465 | Residential<br>Commercial | 1,358,186<br>7,671,526 |
| **Herndon-Monroe** | ½ mile radius<br>(Fairfax Co. only; no density bonuses in Town of Herndon) | 1,967 | 6,711 | Residential<br>Commercial | 1,376,347<br>2,301,066 |
| **Route 28** | ½ mile radius | 2,929 | 9,109 | Residential<br>Commercial | 1,933,966<br>2,762,152 |
| **Route 606** | ½ mile radius | 0 | 2,053 | Residential<br>Commercial | 0<br>691,121 |
| **Route 772** | ½ mile radius | 2,217 | 8,355 | Residential<br>Commercial | 1,064,070<br>2,969,354 |

Commercial includes office, retail, hotel, industrial, and institutional

The projections for the Baseline Alternative reflect the regionally anticipated growth trends in the corridor, and do not reflect recent changes to local comprehensive plans. For example, the Baseline Alternative projections do not account for changes that allow high-intensity development at the Dulles Suburban Center in the Route 28 area, or the shifting of development to proposed station areas in Tysons Corner. Moreover, the Baseline Alternative does not reflect the maximum build-out levels in the corridor. In some cases, the development projected in Table 9.3-1 is only a fraction of the maximum allowed development. For example, in the Mid-Corridor the projected level of development in the station areas under the Baseline Alternative is 23.2 million square feet. However, the recent *Dulles Corridor Land Use Task Force Report* (May 2001) shows that, under the old language contained in the *Fairfax County Comprehensive Plan*, the plan actually allowed for a maximum build-out of 57.6 million square feet of development in these areas (with approved plan options) even without the provision of transit. The changes adopted as a result of the recommendations prepared by the Dulles Corridor Land Use Task Force allow for more development, as long as it is transit-supportive.

### 9.3.3 BRT ALTERNATIVE

Growth projected for the Build Alternatives considered the amount of development that would potentially occur when the transit-related density bonuses were applied. Corridor-wide, the BRT Alternative is expected to result in an increase of 6 million to 23 million square feet of development over the Baseline Alternative, depending on alignment. BRT 1 will result in the greatest transit-related growth for this alternative, because it includes the greatest number of stations in the Mid-Corridor area.

Table 9.3-2 shows the potential level of population, employment, and development within the station areas for the BRT Alternative with the density bonuses. This alternative would not result in changes in development in the Tysons Corner area because, in this area, the *Fairfax County Comprehensive Plan* allows density bonuses for

rail stations only. However, within a half mile of the Wiehle Avenue, Reston Parkway, Herndon-Monroe, and Route 28 stations, there could potentially be substantial increases in both population and employment.

**Table 9.3-2: Population, Employment, and Land Use: BRT Alternative (2025)**

| Station Area | Station Area Size | Population | Employment | Land Use (square feet)* |
|---|---|---|---|---|
| **Tysons Corner Alignment T1** | 1,600 feet radius around 3 station | Same as Baseline | | |
| **Tysons Corner Alignments T6/T9** | 1,600 feet radius around 4 station | Same as Baseline | | |
| **Tysons Corner Alignment T4** | 1,600 feet radius around 6 station | Same as Baseline | | |
| **Wiehle Avenue BRT 1/BRT 2** | ½ mile radius | 7,463 (888% increase over Baseline) | 19,851 (17% increase over Baseline) | Residential 3,862,099<br>Commercial 6,424,204 |
| **Wiehle Avenue BRT 3** | ½ mile radius | Same as Baseline | | |
| **Reston Parkway** | ½ mile radius | 8,973 (234% increase over Baseline) | 26,130 (3% increase over Baseline) | Residential 4,502,157<br>Commercial 8,898,292 |
| **Herndon-Monroe BRT 1/BRT 2** | ½ mile radius (Fairfax Co. only; no density bonuses in Town of Herndon) | 3,844 (95% increase over Baseline) | 9,269 (38% increase over Baseline) | Residential 2,279,544<br>Commercial 3,311,517 |
| **Herndon-Monroe BRT 3** | ½ mile radius (Fairfax Co. only; no density bonuses in Town of Herndon) | Same as Baseline | | |
| **Route 28 BRT 1** | ½ mile radius | 11,441 (291% increase over Baseline) | 27,893 (206% increase over Baseline | Residential 5,789,043<br>Commercial 9,295,893 |
| **Route 28 BRT 2/BRT 3** | ½ mile radius | Same as Baseline | | |
| **Route 606** | ½ mile radius | 0 (no change from Baseline) | 1,999 (2% decrease from Baseline) | Residential 0<br>Commercial 1,399,583 |
| **Route 772** | ½ mile radius | 3,325 (50% increase over Baseline) | 10,217 (22% increase over Baseline) | Residential 1,596,105<br>Commercial 3,621,163 |

Commercial includes office, retail, hotel, industrial, and institutional

The percentage increases in population at Wiehle Avenue, Reston Parkway, and Route 28 are primarily a function of the lack of existing residential development. Residential development is currently prohibited by covenant at many of the parcels in closest proximity to the stations, especially at the Wiehle Avenue and Reston Parkway stations, and is not projected to occur on these parcels in the Baseline Alternative unless the covenants are lifted. If the covenants are lifted and residential development occurs in these portions of the station areas prior to implementation of the BRT Alternative, this alternative's projected population increases over the Baseline Alternative would not be as large.

The significant increase in employment anticipated at Route 28 is due to the fact that the land is currently undeveloped and the levels of development projected in the Baseline Alternative are low. As noted earlier, because the Baseline Alternative uses the currently approved regional projections—which do not yet account

for the allowed development increases in the Route 28 area—the increase in employment associated with density bonuses at Route 28 appears more dramatic than it is likely to be.

Potential population and employment changes would be lower in Loudoun County than in Fairfax County, because density bonuses are not as high in Loudoun County. In addition, since the area is currently undeveloped, the Baseline Alternative includes dense development projects, which are currently approved and will be constructed prior to 2025. The cumulative change is, therefore, small in a relative sense. There would be no potential for population increase at the Route 606 BRT stop because none of the land within one-half mile of the stop is zoned for residential development, though it is possible that this area will be re-zoned by Loudoun County as they revise their zoning ordinance.

Large increases in population would lead to increased demands for local services, including utilities, schools, parks, and other community facilities and services. In addition, the increased population would add traffic to the existing roadway network, resulting in increased congestion, which in turn affects the levels of air pollution, noise, and urban runoff.

Employment increases create fewer impacts on services than population increases. There would be lesser demand placed on parks, schools, and other community facilities by employees than by residents. However, additional employees result in similar impacts on traffic, with resulting increases in air pollution, noise, and urban runoff.

Although these population and employment increases reflect high levels of development at the transit station areas, they do not represent full build-out as allowed under the comprehensive plans for Fairfax and Loudoun counties, even with the density bonuses. For example, development in the Mid-Corridor station areas is projected to increase from 23.2 million square feet under the Baseline Alternative to 44.4 million square feet under BRT 1. This total is still less than the maximum build-out that was permitted by the *Fairfax County Comprehensive Plan* in the station areas prior to the recent transit-related growth amendments, and is less than the amount currently permitted. The growth amendments ensure that future development increases occur in patterns that allow and encourage more people to use transit in the corridor and other alternatives to the auto—clustered, mixed-use, and compact development. Therefore, the increases in development support the goals of the counties in creating a transit-friendly environment within the corridor.

The additional transportation demand analyses conducted to determine secondary development effects did not specifically address the effects of transit-related growth associated with the BRT Alternative. Rather, the quantitative analysis focused on the effects of transit-related growth at proposed Metrorail stations. Because the density bonuses for Metrorail are higher, it is expected that Metrorail will provide for the highest level of development, and therefore, the greatest secondary effects on transportation. The effects for BRT were addressed qualitatively based on this Metrorail analysis and the quantitative analysis performed for BRT using MWCOG's regionally approved land use forecasts.

In general, the transit-related growth associated with the density bonuses allowed under BRT is expected to increase the use of alternative modes (transit, walking, and biking) in the Mid-Corridor and Loudoun County over what is anticipated for the BRT Alternative under the regionally approved forecasts. Secondary development is also expected to increase vehicular volumes in the vicinity of stations in these areas. Marginal increases in transit use and traffic volumes in Tysons Corner are expected; although no density bonuses are associated with BRT stations/stops in this area, increased employment opportunities to the west would likely attract Tysons Corner residents. At the same time, higher residential densities in the Mid-Corridor and

Loudoun County would result in more transit trips to other areas of the region, including Tysons Corner. The increase in transit use and localized traffic congestion for BRT would not be a great as that projected for the Metrorail Alternative under the transit-related growth forecasts (see the following section). More detailed information on development-related travel effects is included in Chapter 22 of the *Traffic Analysis and Station Access Study* (June 2002).

Under BRT 2, the changes in population, employment, and land use would be the same as described for BRT 1, except that there would be no increased growth at Route 28 because the alignment does not include a station at Route 28, the station with the highest development potential. The impacts of these higher population levels would be the same for BRT 2 as those discussed above. Employment increases would not be substantial at any of the station study areas under BRT 2.

Under BRT 3, the changes in population, employment, and land use would be the same as described for BRT 1 except at Wiehle Avenue, Herndon-Monroe, and Route 28, where there would be no increased growth. BRT 3 would include BRT stops rather than stations at Wiehle Avenue and Herndon-Monroe. The *Fairfax County Comprehensive Plan* does not address density bonuses for stops, only stations. In addition, there would not be a station at Route 28.

The impacts of higher population levels would be the same for BRT 3 as those discussed for BRT 1 at the Reston Parkway Station, but elsewhere no substantial population impacts would occur. Employment increases would not be substantial at any of the station study areas under BRT 3.

The additional development densities are expected to have minor additional impacts on cultural resources in the immediate vicinity of the BRT stations/stops. Most of the cultural resources are located outside of the stations areas, with the exception of the Launders House and Ratcliffe/Meiselman House near the Route 28 Station. However these properties have already been proffered as part of current development proposals, which would still take place without the BRT project, albeit at a lower density.

Secondary development at the station/stop areas could also have some minor additional impacts on water resources due to increases in impervious surfaces, primarily in the Mid-Corridor and Loudoun County sections. There are also potential minor additional effects on forested habitats in the area surrounding the Route 606 and Route 772 stops. These impacts are not projected to be significantly greater than those that would occur without the modest increases in development densities. Table 9.3-3 summarizes the effects of the secondary development associated with the BRT Alternative.

**Table 9.3-3: Secondary Development Effects of BRT Alternative**

| Resource Considered | Potential Effects Due to Secondary Development |
|---|---|
| Neighborhoods, Community Services, and Cohesion | Additional demand for public services and facilities due to population and employment increase. |
| Displacements | No additional displacements are projected. |
| Visual and Aesthetic Conditions | Change in visual character at station areas due to new denser, transit-oriented development. Comprehensive plans cluster highest levels of development at transit stations and taper growth away from stations, extensive design guidelines also incorporated into plans. |
| Cultural Resources | Potential impacts at some cultural/historic resources located within immediate vicinity of station/stop areas. |
| Parks and Recreation Resources | Additional demand for use of parks and recreation areas, some visual changes within areas due to denser development at transit station. |
| Geologic Resources | Minor additional effects on geology and topography; potential minor effects on groundwater; no additional effects on prime farmland in Loudoun County. |

| Resource Considered | Potential Effects Due to Secondary Development |
|---|---|
| Water Resources | Minor additional long-term effects to water resources; potential additional runoff impacts from increases in allowable density at station/stop areas. |
| Aquatic Biota and Habitat | No additional impacts are projected. |
| Terrestrial Biota and Habitat | Potential minor additional effects on habitats from modest increases in density at Loudoun County station/stop areas. |
| Rare, Threatened and Endangered Species | No additional long-term effects projected. |
| Traffic | Additional increase in traffic associated with new development. |
| Air Quality | No anticipated exceedance of National Ambient Air Quality Standards. |

### 9.3.4 METRORAIL ALTERNATIVE

Corridor-wide, the Metrorail Alternative has the potential to result in an increase of approximately 38 million to 43 million square feet of development over the Baseline Alternative, depending on alignment. Alignment T4 will result in the greatest transit-related growth, because it includes the greatest number of stations in Tysons Corner.

Table 9.3-4 shows the predicted development characteristics associated with implementation of the Metrorail Alternative. In Tysons Corner, secondary growth related to density bonuses would vary with alignment option. Under all the alignment options, increases in both population and employment would occur. In the Mid-Corridor, population and employment increases would be similar to, but slightly higher than, the BRT Alternative because larger density bonuses are allowed for rail stations than for BRT stations. Population and employment changes would be more moderate in Loudoun County, where density bonuses are lower and dense development is projected to occur as part of the Baseline Alternative. There would be no population increase at the Route 606 Metrorail Station because none of the land within one-half mile of the station is zoned for residential development.

**Table 9.3-4: Population, Employment, and Land Use: Metrorail Alternative (2025)**

| Station Area | Station Area Size | Population | Employment | Land Use (square feet)* | |
|---|---|---|---|---|---|
| **Tysons Corner Alignment T1** | 1,600 feet radius around 3 station | 6,771 (54% increase over Baseline) | 63,584 (32% increase over Baseline) | Residential<br>Commercial | 3,385,527<br>21,103,167 |
| **Tysons Corner Alignments T6/T9** | 1,600 feet radius around 4 station | 11,377 (132% increase over Baseline) | 79,600 (29% increase over Baseline) | Residential<br>Commercial | 5,688,566<br>26,379,018 |
| **Tysons Corner Alignment T4** | 1,600 feet radius around 6 station | 19,825 (81% increase over Baseline) | 105,134 (24% increase over Baseline) | Residential<br>Commercial | 9,912,462<br>34,262,182 |
| **Wiehle Avenue** | ½ mile radius | 8,201 (986% increase over Baseline) | 21,814 (29% increase over Baseline) | Residential<br>Commercial | 4,244,065<br>7,059,565 |
| **Reston Parkway** | ½ mile radius | 9,860 (268% increase over Baseline) | 28,714 (13% increase over Baseline) | Residential<br>Commercial | 4,947,425<br>9,778,343 |
| **Herndon-Monroe** | ½ mile radius (Fairfax Co. only; no density bonuses in Town of Herndon) | 4,224 (115% increase over Baseline) | 10,186 (52% increase over Baseline) | Residential<br>Commercial | 2,504,993<br>3,639,030 |

| Station Area | Station Area Size | Population | Employment | Land Use (square feet)* |
|---|---|---|---|---|
| **Route 28** | ½ mile radius | 12,572 (329% increase over Baseline) | 30,652 (237% increase over Baseline | Residential 6,361,586<br>Commercial 10,215,267 |
| **Route 606** | ½ mile radius | 0 (no change from Baseline) | 2,352 (14% increase over Baseline) | Residential 0<br>Commercial 1,646,568 |
| **Route 772** | ½ mile radius | 5,196 (134% increase over Baseline) | 19,891 (138% increase over Baseline) | Residential 2,493,914<br>Commercial 7,025,057 |

Commercial includes office, retail, hotel, industrial, and institutional

The impacts of higher population levels under the Metrorail Alternative would be similar to, but even greater than, those discussed for BRT 1. At the Wiehle Avenue Station area, population would increase almost 1,000 percent, potentially creating greater impacts on parks, schools, community facilities and services, traffic, air pollution, and noise. Increases at Reston Parkway and Route 28 would also be higher. Substantial population increases (over 100 percent) would also occur at the Herndon-Monroe and Route 772 station areas.

Within Tysons Corner, population increases would be most substantial under Alignment T4. Because Tysons Corner is already urban in character, the increase in population associated with Metrorail would not be considered an impact in this area. Rather, growth is considered a benefit. In fact, the introduction of Metrorail and the associated increase in development allows Tysons Corner to achieve the goal of becoming a more pedestrian-friendly and transit-oriented community as directed by the *Fairfax County Comprehensive Plan*.

Employment increases would occur in Tysons Corner, but would be 32 percent or less. Large increases in employment would occur in the vicinity of the Route 28 and Route 772 station areas. As discussed for the BRT Alternative, the increase projected over the Baseline at Route 28 is likely larger than what would actually occur, because the regional projections used to develop the Baseline estimates in this area do not accurately reflect recently adopted changes in the Comprehensive Plan. Nevertheless, the expected increases would result in traffic and traffic-related air quality and noise impacts in these station areas.

The analysis of travel effects related to secondary development primarily focused on station area travel patterns. For Metrorail-related development, the demand analysis produced estimates of ridership, mode-of-access to stations, transit mode share, pedestrian and bicycle trips, total person and vehicle trips, vehicle miles traveled, and traffic volumes at selected intersections. Detailed information on development-related travel effects is included in Chapter 22 of the *Traffic Analysis and Station Access Study* (June 2002). In general, transit-related development is expected to increase the use of transit and alternate modes in the corridor. An increase in the total number of vehicle trips is also forecast. Key findings are summarized below.

- Ridership for the Metrorail Alternative is expected to increase 14 to 18 percent over the ridership projected in the absence of the increased densities. Even more noteworthy, *new* transit riders are expected to increase by 43 to 45 percent (depending on the alignment) under the transit-related development forecasts.

- Of the nearly 27,100 work trips forecast under the transit-related growth forecasts, over 20,400 trips originate outside the corridor, suggesting that a Metrorail investment in the Dulles Corridor will help to support a growing reverse commute market. Increasing employment densities around Metrorail stations in the Dulles Corridor supports this reverse commute market and allows excess capacity on

a.m. outbound and p.m. inbound trains to be used, resulting in more transit passengers being carried without an increase in operating costs, and, consequently, an improvement in project cost effectiveness.

- When comparing mode of access for Metrorail under the transit-related growth forecasts to that for the regionally approved forecasts, increases can be found for almost every mode of access at every station in the corridor. The most significant increases are expected at the Reston Parkway and Route 28 stations. Route 28 experiences the largest increase in vehicle access activity (parking and drop-off), while Reston Parkway experiences a near tripling of pedestrian activity. For all stations, the number of people walking or biking to the station increase at a higher rate than the number of people driving to the station.

- Within Tysons Corner and the Mid-Corridor, transit mode shares increase roughly one percent for work trips and half a percent for total trips (all trip purposes) under the transit-related growth forecasts. This means that not only is the absolute number of transit trips in the corridor increasing, but so is the percentage of trips being carried on public transportation. This shift reflects the enhanced convenience of transit linkages between residences, workplaces, and discretionary trip destinations (shopping, etc.) provided by the new transit-oriented land use patterns.

- Substantial increases in walk and bike trips are associated with the concentrated development patterns, particularly in Reston, where total walk/bike trips are expected to increase 132 percent.

- The positive effects of increased travel by transit and walking are somewhat offset by increased traffic and automobile emissions. Work vehicle trips are expected to increase up to 20,000 trips per day, and non-commute vehicle trips could increase by as much as 55,000 trips per day. The largest increases for work are in the Herndon/Dulles area, while for total trips the greatest increases are in the Reston area. The increase in non-commute trips in Reston reflect the variety of destinations provided by the mixed-use development anticipated in this area of the corridor.

- Traffic increases would be most substantial in the Mid-Corridor area. In the Wiehle Avenue and Reston Parkway area, aggregate traffic (as measured by vehicle miles traveled) is expected to increase nine percent in the p.m. peak period under the transit-related growth forecasts. Near the Herndon-Monroe and Route 28 stations, p.m. peak-period traffic is projected to increase 12 percent.

- Traffic volumes were examined at several representative intersections in the Tysons Corner and Mid-Corridor station areas. For most, volumes are expected to increase in all travel periods (a.m. and p.m. peak, off-peak). For some intersections along Sunrise Valley Drive and Sunset Hills Road, volumes are forecast to increase approximately 20 percent.

- At some Tysons Corner intersections, traffic volumes under the transit-related growth forecasts are projected to be lower than those under the regionally approved forecasts. These decreases are the result of two factors. First, some of the retail and office development assumed in the regionally approved forecasts is converted to high- and moderate-density residential uses under the transit-related growth forecasts, as allowed in the *Fairfax County Comprehensive Plan*. This residential development proximate to Metrorail stations in Tysons Corner produces a large number of transit trips (primarily home-based work trips), but does not attract the volume of work trips projected under the regionally approved forecasts. Second, the transit-related growth forecasts concentrate development much closer to the transit station areas in Tysons Corner, a fact that is not reflected in the broader regionally approved

projections. This shifting of development better supports transit use, and results in a decrease in auto volumes.

The above findings do not necessarily reflect the worst-case scenario for traffic impacts, nor the best-case scenario for transit and alternative mode use, because (as described in the methodology section) the transit-related growth allowed in Loudoun County was not included the supplemental transportation demand analysis. It can be assumed that additional transit-related growth around Loudoun County stations, as permitted in the *Loudoun County Revised General Plan*, would result in even higher ridership on the regional transit system. Growth in Loudoun County is also expected to increase the number of walk and bike trips in the station vicinities. In addition, vehicle trips would likely increase in station areas, though the extent of these increases would be dependent on the quality of vehicle access to (and circulation within) the Route 606 and Route 772 station areas, which is not known at this time.

The expected increase in commute and non-commute vehicle trips presented above reflects all trips with at least one end within the corridor, and reflects travel over the course of the entire weekday. Because a significant portion of work trips are in the reverse peak direction (i.e., a.m. outbound and p.m. inbound), this demand is carried largely on regional and local roadways, which may more easily absorb additional volumes than peak direction facilities. In addition, much of the additional travel generated by transit-related growth results in off-peak travel, when demand for roadway facilities is lower. Consequently, it is anticipated that a significant portion of the additional vehicle trips resulting from increased development densities (particularly employment) in the Tysons Corner and Mid-Corridor areas will occur in off-peak conditions where capacity constraints on local and regional roadways are less significant.

In addition to these traffic effects (and their associated effects on air quality, noise, and communities), the increased development densities are expected to have minor additional impacts on cultural resources in the immediate vicinity of the Metrorail stations. The impacts from the Metrorail Alternative would be similar to those of the BRT Alternative, although the impacts may be slightly greater due to the increased density allowed for Metrorail stations.

Secondary development at the station areas could also have some minor additional impacts on water resources due to increases in impervious surfaces, primarily in the Mid-Corridor and Loudoun County sections. There are also potential minor additional effects on forested habitats in the area surrounding the Route 606 and Route 772 stations. The impacts from the Metrorail Alternative would be similar to those of the BRT Alternative, although the impacts could be slightly greater due to the increased density allowed for Metrorail stations. However the impacts are not projected to be significantly greater than those that would occur without the modest increases in development densities. Table 9.3-5 summarizes the effects of the secondary development associated with the Metrorail Alternative.

**Table 9.3-5: Secondary Development Effects of Metrorail Alternative**

| Resource Considered | Potential Effects Due to Secondary Development |
|---|---|
| Neighborhoods, Community Services, and Cohesion | Additional demand for public services and facilities due to population and employment increase. |
| Displacements | No additional displacements are projected. |
| Visual and Aesthetic Conditions | Change in visual character at station areas due to new denser, transit-oriented development. Comprehensive plans cluster highest levels of development at transit station and taper growth away from stations, extensive design guidelines also incorporated into plans. |
| Cultural Resources | Potential impacts at some cultural/historic resources located within immediate vicinity of station/stop areas; some already proffered through existing development plans. |

| Resource Considered | Potential Effects Due to Secondary Development |
|---|---|
| Parks and Recreation Resources | Additional demand for use of parks and recreation areas, some visual changes within areas due to denser development at transit station. |
| Geologic Resources | Minor additional effects on geology and topography; potential minor effects on groundwater; no additional effects on prime farmland in Loudoun County. |
| Water Resources | Minor additional long-term effects to water resources; potential additional runoff impacts from increases in allowable density at station/stop areas. |
| Aquatic Biota and Habitat | No additional impacts are projected. |
| Terrestrial Biota and Habitat | Potential minor additional effects on habitats from modest increases in density at Loudoun County station/stop areas. |
| Rare, Threatened and Endangered Species | No additional long-term effects projected. |
| Traffic | Additional increase in traffic associated with new development. |
| Air Quality | No anticipated exceedance of the National Ambient Air Quality Standards. |

As discussed for the BRT Alternative, the total increase in development projected under the Metrorail Alternative is less than the total build-out permitted by the Fairfax and Loudoun county comprehensive plans in the absence of transit. In the Mid-Corridor area, Metrorail is forecast to result in 48.8 million square feet of development, while total allowable build-out for transit-related growth in the Mid-Corridor is approximately 70 million square feet. The compact, high-density form of development will promote mobility much more effectively than sprawled development with a one to two percent transit mode share.

Overall, though the transit-related growth associated with Metrorail implementation will result in increased development and increased traffic congestion in station areas, this change is consistent with local goals and comprehensive plans. As shown above, the clustered development at transit station platforms will foster a higher mode split for transit. Moreover, the increase in densities combined with the transit investments, results in a greater number of transit trips, pedestrian trips, and non-single-occupant vehicle trips in the corridor.

### 9.3.5 BRT/METRORAIL ALTERNATIVE

Under the BRT/Metrorail Alternative, the changes in population, employment, and land use in Tysons Corner would be the same as those described for the various Metrorail alignments. Throughout the remainder of the corridor, the changes in population, employment, and land use would be the same as for the BRT Alternative.

Secondary effects of the increased growth in Tysons Corner would generally be the same as those described for the Metrorail Alternative. However, traffic increases at representative intersections in Tysons Corner may be higher for the BRT/Metrorail Alternative because the forced transfer from BRT to rail at Tysons West makes transit slightly less attractive than a seamless Metrorail trip from the western end of the corridor. As a result, it is possible that secondary development associated with the BRT/Metrorail Alternative could attract more vehicle trips to Tysons Corner from the Mid-Corridor and Loudoun County.

Secondary effects in the remainder of the corridor would be the same as those described for the BRT Alternative.

### 9.3.6 PHASED IMPLEMENTATION ALTERNATIVE

In accordance with the *Fairfax County Comprehensive Plan* and the *Loudoun County Revised General Plan*, the allowable density bonuses for Metrorail would apply. Therefore, the changes in population, employment, and

land use, and the resultant secondary effects would be the same as those described above for the Metrorail Alternative.

## 9.4 CUMULATIVE EFFECTS

Determining the cumulative environmental consequences of an action requires delineating the cause-and-effect relationships between the multiple actions and the resources, ecosystems, and human communities of concern. The analysis of cumulative impacts addresses the "mitigated condition" for both the Dulles Corridor Rapid Transit Project and the other projects included in the analysis.

In determining the cause-and-effect relationships between the multiple actions and the resources, ecosystems, and human communities of concern, the projects listed in Table 9.1-2 were reviewed in conjunction with the social, environmental, economic, and transportation effects detailed in the Draft EIS. If the proposed project and the other projects added together would result in an impact that would be considered substantial as a direct impact, then a substantial cumulative impact would occur. At this point, the proposed project level of contribution to the cumulative impact must be considered and mitigation, if available, must be identified appropriate to that contribution.

The types of cumulative effects that would occur under each of the Build Alternatives are similar, differing only slightly in magnitude between the alternatives. The biggest difference is in the density bonuses allowed and development effects between the station areas for these alternatives. The types of cumulative effects that would occur are discussed below.

Cumulative effects to most of the resources assessed are not expected to occur. Many of the projects analyzed are located within existing public rights-of-way or in urbanized areas where effects are limited, especially in relation to natural resources. The direct effects of the Build Alternatives are minimal since most of the alignments under consideration are located within existing transportation corridors or areas that are already developed. Thus, the contribution of the Build Alternatives to cumulative effects in the larger context is limited.

The primary potential for cumulative effects occurs when considering the direct and secondary effects of the Build Alternatives in conjunction with increases in density at transit stations and other transportation projects. In Loudoun County, substantial new growth is projected in the Baseline Alternative that would be constructed in an undeveloped area. Several of the transportation projects are also located in Loudoun County, as are improvements planned at Dulles Airport. The cumulative effect would be the conversion of natural habitat into impervious surface within several watersheds. However, the contribution of the Dulles Corridor Build Alternatives to the overall cumulative change projected is minimal. The secondary development at the Route 606 and Route 772 station areas is not as large as that projected in Fairfax County and these effects would be limited to a half-mile radius around each station.

In Fairfax County, the main potential for cumulative effects is associated with the combination of secondary development effects, the transportation projects, and the Dulles Corridor Rapid Transit Project Build Alternatives. Substantial increases in population, housing, and employment are likely to occur near the BRT and Metrorail stations throughout the corridor. When considering these effects in relation to the other projects listed above and their potential to also increase population, housing, and employment in similar areas, cumulative effects would occur. These cumulative effects are most closely related to traffic considerations, visual character, and to a lesser extent, neighborhoods. From a cumulative effects perspective, the growth in the

Baseline Alternative (although not caused by the project) added to the potential secondary development at the transit station areas, as well as improvements to transportation facilities has the potential to change the development character within the corridor.

However, the final determination of the level of development, and the associated traffic generated by that development, lies with the local jurisdictions who have adopted specific guidelines to ensure that the new development in the station areas not only supports transit, but also respects the neighborhoods that are in the vicinity of the transit stations. As part of the site development process, localities can require that the overall development does not have negative impacts on neighborhoods, roads, and other public facilities. In this sense, the impacts of new development at the transit station areas can be mitigated. In Tysons Corner, the Mid-Corridor area, and Loudoun County, there are "triggers" that will limit the cumulative level of development if the transportation system cannot support the increase and still function at an acceptable level of service. Detailed impact assessments are part of the planning process for new development projects, so the overall level of effect will be mitigated as part of the project development process. In addition, the comprehensive plans for both localities are designed to limit development to urban areas in the closest proximity to the transit station.

In comparison to the Baseline Alternative, which allows substantial development to occur without any significant improvements to the transportation system, the Build Alternatives would allow the localities to provide a better linkage between secondary development and the transportation system, reducing the potential for cumulative effects.

Changes in land use would occur under the Baseline and Build Alternatives and if the other projects referenced above are implemented. These changes would be most dramatic in Loudoun County where land use that is currently rural in nature would convert to mixed use suburban centers. These changes are recommended in the *Loudoun County Revised General Plan* and are anticipated to occur regardless of this project.

The Baseline Alternative, Build Alternatives, and other projects would all likely have minor impacts to water resources, aquatic biota and habitat, and terrestrial biota and habitat, which when considered together could have cumulative impacts. These effects include minor impacts on water quality during construction, increased runoff from impervious surfaces, and small reductions of habitat. Best management practices for stormwater runoff and sediment and erosion control required by the Commonwealth and local jurisdictions are anticipated to minimize the effect to water quality and aquatic habitat. To protect terrestrial habitat, both counties have comprehensive plans that encourage open-space and recreational areas.

As described in the previous section, traffic conditions in the corridor are anticipated to worsen as the population and employment increase. The Build Alternatives and many of the projects in the Baseline Alternative are aimed at alleviating this condition. Some proposed actions, such as the new Smithsonian Air and Space Museum and the Center for Innovative Technology, are expected to increase traffic in the corridor; however the Dulles Corridor Rapid Transit Project and the other improvement projects evaluated above are designed to enhance roadway and transit access to these new developments. Because these projects increase transportation capacity and access options, cumulative traffic impacts are not anticipated.

## 9.5 MITIGATION

Secondary and cumulative effects associated with this project are related primarily to the change due to growth not only in the Baseline Alternative, but also associated with secondary development at the transit station areas. As discussed above, in many respects the county development permitting processes would mitigate any potential

for adverse secondary and cumulative impacts to neighborhoods, cultural resources, and natural resources. The regulations allow the localities to cluster future development in locations that are best able to support that development in terms of providing transit, walking, and biking alternatives to residents and employees.

In adopting the transit-related growth amendments in their comprehensive plans, Fairfax and Loudoun counties established a 20 percent transit mode share goal. Due to clustering of development at stations and the expected increase in localized traffic congestion at these locations, it may be easier to achieve a 20 percent transit mode share near stations, rather than for the corridor as a whole. However, if this goal is not met, the counties may limit development to mitigate the associated transportation impacts.

Many of the predicted secondary traffic effects are at intersections that would require mitigation even in the absence of increased development. Several of the mitigation measures proposed for these intersections (the addition of through lanes and turn lanes), may also accommodate traffic increases projected under the transit-related growth forecasts—particularly for intersections at Route 123/Colshire Road and Herndon Parkway/ Centreville Road, and along Sunrise Valley Drive and Sunset Hills Road.

Significant peak-period increases at some intersections may require mitigation measures beyond those previously identified. However, the transit-related growth patterns have significant potential to support traffic mitigation through employer-based travel demand management (TDM) strategies. The compact, mixed use development in station areas enhances accessibility by transit, walking, and biking. All of these characteristics facilitate employer-based TDM strategies and can greatly improve a program's success in reducing single-occupant vehicle travel volumes. People are already more likely to walk or use transit in an area that is pedestrian- and transit-friendly; if a TDM program provides incentives to use these modes (especially monetary incentives), people will be more likely to use them.

Basic categories of employer-based TDM strategies include:

- Financial/time incentives
- Parking management
- Preferential treatment for ridersharers (carpools, vanpools)
- Information and marketing

Some possible elements include allowances or subsidies for modes other than the SOV, disincentives for SOV's such as parking restrictions or charges, telecommuting, and variable work hours (flex time). Employers may also provide amenities that support alternate modes of travel, such as bicycle lockers, shower facilities, a rideshare program with a guaranteed ride home, and an on-site coordinator to arrange ridesharing and promote the TDM program.

Parking supply regulation is the single most effective TDM strategy. People are far less likely to drive if limited parking is available, especially if they have to pay for it. Fairfax County may consider reducing parking supply requirements and placing maximums on allowed parking for office developments in the vicinity of stations. At the same time, they can regulate parking costs and aggressively promote the application of employer-based TDM strategies that discourage people from traveling alone to work. Parking-related strategies might include parking subsidies for ridesharers and reduced rates or preferential parking for high-occupancy vehicles.

# Evaluation of Alternatives 10

# 10 EVALUATION OF ALTERNATIVES

This chapter presents a comparative evaluation of the alternatives considered for the Dulles Corridor Rapid Transit Project. The intent of this evaluation is to demonstrate the relative effectiveness of each alternative in meeting the stated project goals and objectives, and to highlight the key differences between alternatives to facilitate the decision-making process.

**Section 10.1** discusses the performance of the Baseline and Build Alternatives relative to evaluation criteria and measures that reflect the project goals and objectives. In most cases, the criteria and measures correspond to the effects documented in Chapters 3 through 9 of this Draft Environmental Impact Statement (EIS).

**Section 10.2** presents a trade-off analysis that focuses on the essential differences between alternatives and alignment options, highlighting the basic advantages and disadvantages of each.

**Section 10.3** outlines issues to be resolved and future coordination efforts.

## 10.1 EVALUATION RELATIVE TO PROJECT GOALS AND OBJECTIVES

As described in Chapter 1, the goals and objectives for the Dulles Corridor Rapid Transit Project are intended to reflect the transportation needs of the corridor. Project goals range from improving public transit and broadening the availability of transportation services, to supporting future land use development patterns, to preserving and enhancing neighborhood and environmental quality.

The effectiveness of each of the alternatives was determined using a set of evaluation criteria and measures that correspond to the specific objectives for each goal. These criteria were developed to address local and regional goals.

In the following sections, two basic types of analysis are presented. The first is a general evaluation of how well the Build Alternatives as a whole (i.e., the Dulles Corridor Rapid Transit Project) perform as compared to the Baseline Alternative. This "Build vs. Baseline" analysis is useful for determining if, in fact, a major transit investment in the corridor would improve travel conditions and, in general terms, meet the goals and objectives of the project. The second analysis focuses on the relative performance of the Build Alternatives and their various alignment options. This "Build vs. Build" comparison is intended to facilitate the selection of a locally preferred alternative to advance into the Final EIS.

The discussion in this section is organized by project goal. Sections 10.1.1 through 10.1.3 describe the overall effectiveness of alternatives and alignment options relative to transportation, social, and environmental considerations. Section 10.1.4 addresses the cost-effectiveness and financial feasibility of alternatives, and Section 10.1.5 discusses the equity of each alternative. Each section includes a summary table that recaps the results of the "Build vs. Baseline" and "Build vs. Build" analyses for the corresponding goal.

### 10.1.1 GOALS 1 AND 2: IMPROVE TRANSPORTATION SERVICE AND INCREASE TRANSIT RIDERSHIP

The first two goals of the Dulles Corridor Rapid Transit Project reflect a desire to provide improved public transportation services in the corridor and to contribute to the improved performance of the overall regional transportation system. Analyses for these two goals are presented together because, as Table 10.1-1 demonstrates, they share several common objectives.

**Table 10.1-1: Objectives for Goals 1 and 2**

| **Goal 1 – Improve Transportation Service** |
|---|
| ▪ Provide more frequent service for trips to the core of the region, Tysons Corner, Reston/Herndon, Dulles Airport, and eastern Loudoun County.<br>▪ Provide multi-modal access.<br>▪ Improve travel times within the corridor and the region.<br>▪ Provide integrated, seamless transit service through Tysons Corner and other major activity centers.<br>▪ Provide improved transit service in the corridor in the near term. |
| **Goal 2 – Increase Transit Ridership** |
| ▪ Provide more frequent service for trips to the core of the region, Tysons Corner, Reston/Herndon, Dulles Airport, and eastern Loudoun County.<br>▪ Provide multi-modal access.<br>▪ Improve the amenities of the existing transit service within the corridor and the region.<br>▪ Improve travel times within the corridor and the region.<br>▪ Provide integrated, seamless transit service through Tysons Corner and other major activity centers.<br>▪ Provide improved transit service in the corridor in the near term. |

#### 10.1.1.1 Provide More Frequent Service

A key factor in making public transportation an attractive mode is service frequency. Frequent service with high levels of availability throughout the day is generally perceived by travelers as more convenient, and as a result such a service tends to experience higher demand.

Frequency of transit service under each Build Alternative and in the baseline condition is discussed in detail in Section 6.3. In general, peak period service is good under all alternatives. The Baseline Alternative features a range of headways reflecting the multiple express and line haul bus routes operating in the corridor. Under the Build Alternatives, many of these routes are modified to complement rapid transit service in the corridor. The Build Alternatives have similar service frequencies and hours of operation because all were designed to be consistent with current Metrorail operations. Accordingly, the proposed Metrorail alignments and most BRT route patterns operate with 6-minute headways in the peak period and 12-minute headways at most other times. In some route patterns for BRT 2 and BRT 3, frequencies improve to 4 minutes or decline to 12 minutes in the peak period, or are reduced to 24 minutes in the off-peak period, as dictated by forecast demand.

The level of service that would be provided under each of the Build Alternatives is far better than what would be provided under the Baseline Alternative. This is particularly true during off-peak hours, where headways for most travel markets in the corridor improve from 60 minutes to 12 minutes.

#### 10.1.1.2 Provide Multimodal Access

Multimodal access is an important feature of a well-functioning regional transportation system. A multimodal transportation system offers users choices among several travel modes based on individual values of cost, convenience, and travel time. Thus, providing complementary intermodal facilities that facilitate easy

movement between modes is critical to ensuring a strong demand for multimodal trips. Measures of multimodal access analyzed for this evaluation include park-and-ride capacity, feeder bus capacity, transit mode share at Washington Dulles International Airport (Dulles Airport), and the person-moving capacity of the Dulles Corridor under each alternative.

Park-and-ride capacity for the Baseline Alternative and the Build Alternatives are presented in Sections 6.1 and 6.4.1, respectively. For the Baseline Alternative, approximately 6,400 parking spaces would be available in the corridor by 2025, whereas, for the Build Alternatives, parking capacity would be nearly double the baseline levels by 2025. Each proposed station or stop is assumed to provide the same number of parking spaces under each Build Alternative. However, because the Metrorail and BRT/Metrorail alternatives (and thus the later stages of the Phased Implementation Alternative) include a 2,000-space park-and-ride facility at the Tysons West Station in Tysons Corner, implementation of these alternatives would result in higher parking capacity than the BRT Alternative, which lacks the Tysons West Station. BRT 2 and BRT 3 also lack the Route 28 Station and its supporting parking. For the Phased Implementation Alternative, parking capacity in the corridor would increase with each successive phase of the project.

Another measure of multimodal access is peak-hour feeder bus volumes serving each station and stop; the greater the number of local buses serving a station, the higher the level of access from surrounding neighborhoods and outlying areas. Table 10.1-2 below presents the number of peak-hour buses serving each station and stop for each alternative. Note that under the Phased Implementation Alternative, Metrorail would be developed in the corridor by 2010; therefore, the 2025 bus volumes for this alternative would be identical to those for the Metrorail Alternative. Both the Phased Implementation and BRT/Metrorail alternatives would have a range of volumes, depending on the BRT and/or Metrorail alignments selected; however, only one representative alignment is shown for these alternatives in the table.

**Table 10.1–2: Peak-Hour Feeder Bus Volumes by Alternative (2025)**

| Station or Stop | Baseline | BRT | | | Metrorail | | | BRT/ Metrorail | Phased Implementation |
|---|---|---|---|---|---|---|---|---|---|
| | | BRT 1 | BRT 2 | BRT 3 | T1 | T6/T9 | T4 | BRT 1/T4 | T4 |
| Tysons East | – | – | – | – | 6 | 6 | 6 | 6 | 6 |
| Tysons Central A | – | – | – | – | – | – | 12 | 12 | 12 |
| Tysons Central B | – | – | – | – | – | – | 23 | 23 | 23 |
| Tysons Central C | – | – | – | – | – | – | – | – | – |
| Tysons Central (D) | – | – | – | – | 33 | 33 | 33 | 29 | 33 |
| Tysons West | – | – | – | – | 39 | 39 | 39 | 51 | 39 |
| Spring Hill/Tysons-West*Park | 39 | 41 | 41 | 41 | – | – | – | – | – |
| Wiehle Avenue | 33 | 16 | 16 | 16 | 19 | 19 | 19 | 16 | 19 |
| Reston Parkway | – | 23 | 23 | 23 | 20 | 20 | 20 | 23 | 20 |
| Herndon-Monroe | 49 | 30 | 30 | 30 | 24 | 24 | 24 | 30 | 24 |
| Route 28 | – | 10 | – | – | 11 | 11 | 11 | 10 | 11 |
| Dulles Airport | – | – | – | – | – | – | – | – | – |
| Route 606 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Route 772 | – | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| TOTAL | 131 | 133 | 123 | 123 | 159 | 159 | 200 | 254 | 200 |

As the table shows, the number of feeder buses serving each station or stop is comparable across Build Alternatives. However, because the total volumes of feeder buses for an alternative or alignment is a function of the total number of stations or stops, the BRT/Metrorail, Metrorail, and Phased Implementation alternatives result in higher feeder bus requirements in 2025 than the BRT Alternative. The highest number of feeder buses would serve Alignment T4.

Another example of intermodal access is air passenger mode of arrival at Dulles Airport. Section 6.4.3 presented an analysis of mode share for Dulles Airport passengers for each of the Build Alternatives. The analysis showed that the Metrorail or Phased Implementation Alternative would generate the highest transit mode share in 2025 (12.7 to 13.0 percent) among the Build Alternatives, but every Build Alternative would result in substantially higher transit mode shares for air passengers than the baseline condition.

A final measure of multimodal access considered is the overall person-moving capacity provided in the Dulles Corridor under each alternative. One of the advantages of public transportation is its ability to transport a larger number of passengers per vehicle than private automobiles. This is important for many highways in the corridor, particularly the Dulles Toll Road, which in 2025 is forecast to operate beyond capacity in the peak hours. Under these conditions, the Toll road will require alternative capacity to counter the tendency for congestion to spread over longer periods of time. For the Dulles Corridor Rapid Transit Project, the person-moving capacity of each transit alternative under consideration was added to the capacity provided by the DAAR and the Dulles Toll Road to determine the Dulles Corridor's overall person-moving capacity.

Table 10.1-3 presents the passenger throughput in the Dulles Toll Road for the Baseline and Build Alternatives. Passenger throughput is the number of individuals that can comfortably (in terms of assumed vehicle occupancy) and conveniently (in terms of acceptable speeds) travel through a given point in the corridor during a specific time period. For this analysis, throughput was measured in the vicinity of Wiehle Avenue in the peak direction during the peak hour. For the Dulles Toll Road, a vehicle occupancy rate of 2.2 passengers per vehicle (ppv) in the high-occupancy vehicle lane and 1.1 ppv in the general purpose lanes was assumed. It was also assumed the road operates at Level of Service (LOS) E, which would result in an average travel speed of about 50 miles per hour (LOS is further described in Section 6.1.1). For the DAAR, private vehicles were excluded from the analysis because the road will continue to only serve airport-related vehicle traffic; however, passengers of BRT and Fairfax and Loudoun County express buses operating in the DAAR were included. A load factor of 61 passengers per articulated bus and 40 passengers per express bus was assumed. For the Metrorail and Phased Implementation alternatives, a load factor of 120 passengers per railcar is assumed.

**Table 10.1-3: Peak Hour, Peak Direction Passenger Throughput, Dulles Toll Road at Wiehle Avenue**

| | Baseline | BRT | Metrorail | BRT/Metrorail | Phased Implementation |
|---|---|---|---|---|---|
| Dulles Toll Road | 14,545 | 14,545 | 14,545 | 14,545 | 14,545 |
| Dulles Airport Access Road (Express and BRT vehicles) | 840 | 2,370 | 200 | 2,370 | 200 |
| Dulles Corridor Metrorail | – | – | 9,690 | – | 9,690 |
| Total | 15,385 | 16,915 | 24,435 | 16,915 | 24,435 |
| Increase over Baseline | – | + 10% | + 60% | + 10% | + 60% |

BRT and BRT/Metrorail assume BRT 1.

Table 10.1-3 shows that each Build Alternative will increase the Toll Road's passenger throughput in the vicinity of Wiehle Avenue as compared to the Baseline Alternative. For the BRT and BRT/Metrorail

alternatives, BRT service operating on the DAAR would increase the overall passenger throughput of the corridor by approximately 10 percent. Implementation of Metrorail in the median of the DAAR, however, would increase passenger throughput (at assumed conditions) by 60 percent. Consequently, while highway conditions are not expected to improve after implementation of any Build Alternative (as documented in Section 6.2.2), overall mobility in the corridor would increase under each Build Alternative, and most significantly under the Metrorail and Phased Implementation alternatives. Note that for Phased Implementation, the passenger-moving capacity of the corridor would gradually increase, ultimately providing the same throughput as the Metrorail Alternative.

#### 10.1.1.3 Improve Travel Times within the Corridor and Region

As discussed in Chapter 6, travel time is a key measure in evaluating the performance of a given transportation system. None of the Build Alternatives would have a measurable effect on highway travel times between several heavily traveled regional origin-destination (O/D) pairs; however, depending on the trip and alternative, the Dulles Corridor Rapid Transit Project would have an impact on transit travel time for the same set of O/D pairs.

Table 10.1-4 shows travel time by each alternative and alignment option in 2025 and highlights the alternative or alignment that provides the shortest travel time for the specified O/D pairs. By 2025, travel times associated with the Phased Implementation Alternative would be the same as those for the Metrorail Alternative; however, travel times for Phased Implementation would improve much earlier than the Metrorail Alternative, beginning with the implementation of BRT.

**Table 10.1-4: Transit Travel Time for Select O/D Pairs – 2025 (minutes)**

| Origin-Destination Pairs | | Baseline | | BRT | | | Metrorail | | | BRT/ Metrorail | Phased Implementation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Highway | Transit | BRT 1 | BRT 2 | BRT 3 | T1 | T6/ T9 | T4 | BRT 1/T4 | T4 |
| Tysons-West*Park Transit Station | Metro Center | 35 | 37 | *34* | 37 | *34* | 36 | 38 | 38 | 38 | 38 |
| Reston Town Center | Union Station | 59 | 57 | 51 | *49* | 52 | 50 | 51 | 51 | 57 | 51 |
| Union Station | Reston Town Center | *46* | 78 | 58 | 63 | 60 | 55 | 56 | 57 | 64 | 57 |
| Rosslyn | Dulles Airport | 36 | 64 | 45 | 50 | 47 | *42* | 43 | 44 | 51 | 44 |
| Herndon-Monroe | Pentagon | 57 | *50* | 52 | 51 | 54 | 54 | 55 | 55 | 60 | 55 |
| Herndon-Monroe | Tysons Corner Center | 26 | 42 | 33 | 39 | 41 | *25* | 26 | 26 | 30 | 26 |
| Tysons Corner (west) | Dulles Airport | 21 | 72 | 33 | 48 | 45 | *19* | *19* | *19* | 21 | *19* |
| Reston Town Center | Tysons Center (east) | 25 | 46 | 31 | 30 | 33 | *18* | 19 | 19 | 25 | 19 |
| Reston Town Center | Dulles Airport | 12 | 44 | 11 | 13 | 12 | *8* | *8* | *8* | *8* | *8* |

The shortest travel time among alignments for each O/D pair are indicated with underlining and italics.

The table indicates that for all but one O/D pair, the Build Alternatives improve transit travel times over the Baseline Alternative. Among the Build Alternatives, Metrorail and Phased Implementation provide the shortest travel time for the most O/D pairs. In general, these alternatives are most time-competitive for trips that either originate or end in Tysons Corner, likely due to the greater geographic coverage they provide in Tysons Corner compared to the BRT Alternative. The Metrorail and Phased Implementation alternatives also provide the shortest travel time by transit for the reverse commute trips shown above (Union Station to Reston Town Center and all Dulles Airport trips). Not only does Metrorail provide for the shortest travel times for the most O/D pairs, it is also the most time-competitive with highway travel (travel by private vehicle).

#### 10.1.1.4 Provide Seamless Service

As noted in Section 6.3.2, the number of transfers required to make a trip is one of the most important determinants of passenger convenience and comfort. Consequently, the ability of each Build Alternative to provide as "seamless" a service as possible between points of high travel activity is a key measure of its effectiveness.

For the O/D pairs analyzed above, the Metrorail Alternative (and ultimately the Phased Implementation Alternative) provides the most seamless service among Build Alternatives, often providing a one-seat ride between origin and destination. Where transfers are required, they are within the regional rapid transit system; therefore, perceived transfer "penalties" are mitigated by completely sheltered environments and the ability to transfer between lines without paying an additional fare or showing a transfer pass. It should be noted, however, that Alignment T4 requires a rail-to-rail transfer at Tysons West for westbound passengers traveling to the Tysons Central C and Tysons Central D stations, while eastbound passengers traveling to Tysons Central A and Tysons Central B must transfer at Tysons East and double back.

The BRT Alternative requires at least one intra-system transfer between the corridor and any destination east of West Falls Church, while the BRT/Metrorail Alternative requires at least one such transfer for trips between points west and east of Tysons Corner. For these trips, the BRT or BRT/Metrorail Alternative (or the initial stages of the Phased Implementation Alternative) generally would require the same number of transfers as transit services operating under the Baseline Alternative, but would not require transfers between different service providers.

#### 10.1.1.5 Improve the Amenities of Existing Transit Service

As shown in the preceding sections, each of the Build Alternatives would result in improved corridor transit service levels over assumed baseline levels. Specifically, the Build Alternatives would result in marginally more frequent service in the peak period and substantially more frequent service during the off-peak period. For most trips, the Build Alternatives would improve travel times and require fewer transfers. Implementation of the project would also result in increased vehicular and bus access (as measured by parking capacity and peak-hour bus volumes, respectively) to express and/or line-haul services.

As an added enhancement to existing transit service in Virginia and Washington, D.C., implementation of the BRT/Metrorail, Metrorail, or Phased Implementation Alternative would result in improved off-peak period frequencies for all existing Metrorail stations between the East Falls Church and Stadium-Armory stations. Because Dulles Corridor service would connect to the existing Orange Line and continue on to the core, the 12-minute off-peak service on the Orange Line service would be supplemented by the 12-minute off-peak Dulles Corridor service, resulting in a combined 6-minute frequency. However, peak period service at the West Falls Church Metrorail Station would fall from 3-minute headways to 6 minutes, as the supplemental

tripper service is replaced by the Dulles Corridor Metrorail service, which does not serve West Falls Church Station.

#### 10.1.1.6 Transit Patronage

The ultimate result of improved transit service levels is an increase in patronage of the regional transit system. Section 6.3.3 describes forecast transit ridership for each of the Build Alternatives and alignments in their forecast and opening years. Table 10.1-5 below presents system and corridor-related ridership by alternative and alignment in 2025.

The Table 10.1-5 shows that the Metrorail and Phased Implementation alternatives, specifically Alignments T6 and T9, would generate the highest ridership for all patronage measures (corridor ridership and boardings, home-based work and total trips on regional rail, and total trips and new riders systemwide). While the BRT/Metrorail and BRT alternatives serve fewer trips, both alternatives (and their respective alignments) carry more riders than the Baseline Alternative.

**Table 10.1–5: Transit Patronage Forecasts, Baseline and Build Alternatives (2025)**

| Alternative | Total Riders | Boardings | Home Based Work Rail/BRT Trips | Total Rail/BRT Trips | Total Transit Trips | New Riders |
|---|---|---|---|---|---|---|
| Baseline | – | – | 578,800 | 929,100 | 1,279,700 | – |
| BRT | | | | | | |
| BRT 1 | 49,400 | 28,000 | 592,600 | 956,300 | 1,292,200 | 12,500 |
| BRT 2 | 48,000 | 26,900 | 592,600 | 955,200 | 1,291,100 | 11,400 |
| BRT 3 | 47,100 | 25,800 | 591,900 | 954,800 | 1,290,600 | 10,900 |
| Metrorail | | | | | | |
| T1 | 86,300 | 52,100 | 609,700 | 990,200 | 1,317,000 | 37,300 |
| T6/T9 | 86,900 | 53,200 | 609,500 | 990,900 | 1,318,000 | 38,300 |
| T4 | 83,800 | 51,000 | 608,400 | 988,400 | 1,316,500 | 36,800 |
| BRT/Metrorail (BRT 1/T4) | 70,500 | 42,200 | 601,000 | 977,100 | 1,304,800 | 25,100 |
| Phased Implementation (T4) | 83,800 | 51,000 | 608,400 | 988,400 | 1,316,500 | 36,800 |

Though only one representative alignment is shown for BRT/Metrorail and Phased Implementation, these alternatives would have a range of values, depending on the selected alignments.

As noted in Section 6.4.3, Metrorail ridership was also estimated for the forecast year assuming that there is additional development around stations in Tysons Corner and Reston, as permitted under the *Fairfax County Comprehensive Plan*. For Metrorail and Phased Implementation, transit-related growth associated with density bonuses would lead to higher employment and population totals in the corridor than are currently projected in the Metropolitan Washington Council of Government's (MWCOG) Round 6.2 regional land use forecasts. This additional development is forecast to generate approximately 14 to 18 percent more ridership than reported in Table 10.1.5, and 43 to 45 percent more new transit riders. Therefore, under the transit-related growth forecasts, the Metrorail and Phased Implementation alternatives would have twice as much ridership as the BRT/Metrorail Alternative.

#### 10.1.1.7 Provide Improved Service in the Near Term

Increasing population and employment growth in the Dulles Corridor (see Chapter 3) and associated increases in traffic congestion (see Chapter 6), point to the need to implement transit improvements in the corridor as quickly as possible. Construction of the Metrorail Alternative between the Orange Line and Route 772 in Loudoun County would take several years to complete; whereas, the Phased Implementation and BRT alternatives would provide improved service in the Dulles Corridor much more quickly. For the BRT Alternative and the initial phase of the Phased Implementation Alternative, the implementation of BRT by 2005 would enhance the frequency and span of service in the corridor to match that provided regionally by the existing Metrorail system. BRT would provide access to new line-haul transit service in the vicinity of Reston Parkway and Route 28 (for BRT 1), as well as to enhanced facilities at Wiehle Avenue (including expanded parking), Herndon-Monroe, and the Tysons-West*Park Transit Station. Transit service to Dulles Airport would increase substantially, and Loudoun County service would be expanded at the Dulles North Transit Center near Route 606. In addition, new service would be provided from a stop at Route 772. Overall, BRT would increase transit capacity in the corridor, and generally improve travel times as compared to transit services provided under the Baseline Alternative.

Under the Phased Implementation Alternative, the improved service offered by BRT would be gradually enhanced and expanded. Transit travel times, capacity, and access would continue to improve with each successive phase of the project. However, for Phased Implementation, the conversion of BRT to Metrorail in the Mid-Corridor section of the Dulles Corridor would displace the Metrorail-like service provided by BRT 1 and BRT 2 for a period of 15 to 18 months, while the median portions of the BRT stations are used for Metrorail construction, start-up, and testing. During this time, BRT 1 and BRT 2 service would operate to and from the BRT station facilities, similar to the service provided under BRT 3. For BRT 3, service would not have to be restructured during conversion, because the only median station for this alignment is the multi-level station at Reston Parkway. This station was designed as a two-level station so that BRT service could continue uninterrupted while BRT is converted to Metrorail.

#### 10.1.1.8 Summary

The relative performance of alternatives with respect to Goals 1 and 2 is summarized in Table 10.1-6. The results for both the "Build vs. Baseline" and "Build vs. Build" analyses are identified.

**Table 10.1-6: Summary of Evaluation Results for Goals 1 and 2**

| | |
|---|---|
| **Provide More Frequent Service** | |
| Headways/Span of Service | ▪ Build vs. Baseline: Service frequencies and span of service are much better for the Build Alternatives than for the Baseline Alternative.<br>▪ Build vs. Build: All Build Alternatives have been designed to provide similar frequencies and span of service. |
| **Provide Multimodal Access** | |
| Park-and-Ride Capacity | ▪ Build vs. Baseline: All Build Alternatives result in increased parking capacity over baseline conditions.<br>▪ Build vs. Build: Parking capacity assumptions are the same for each station and stop under each alternative. Total corridor parking capacity is lowest under BRT because this alternative does not include the Tysons West Station or its associated parking. |
| Feeder Bus Volumes | ▪ Build vs. Baseline: All Build Alternatives result in increased feeder bus volumes over baseline conditions.<br>▪ Build vs. Build: Metrorail and Phased Implementation (specifically T4) provide for the highest feeder bus volumes. In general, total corridor bus volumes reflect the number of stations and/or stops in a given alternative, not the mode of transportation. |
| Air Passenger Transit Mode Share | ▪ Build vs. Baseline: All Build Alternatives result in substantially higher transit mode shares |

| | |
|---|---|
| | for passengers accessing Dulles Airport than experienced in the baseline condition.<br>▪ Build vs. Build: Metrorail and Phased Implementation (specifically T1) provide for the highest transit mode share at Dulles Airport among Build Alternatives. |
| Person-Moving Capacity | ▪ Build vs. Baseline: All Build Alternatives improve the passenger throughput of the Dulles Corridor over the Baseline.<br>▪ Build vs. Build: Metrorail and Phased Implementation provide the greatest increase in passenger throughput among the Build Alternatives. |
| **Improve Travel Times** | |
| Improve Travel Times | ▪ Build vs. Baseline: Except for O/D pairs served in the Baseline Alternative by frequent express bus service, the Build Alternatives generally result in improved travel times. An exception to this is for some travel markets with at least one trip end in central Tysons Corner, where local corridor bus service results in shorter travel times than BRT because they operate within Tysons Corner and BRT forces a transfer at the Spring Hill Road/Tysons-West*Park Transit Station.<br>▪ Build vs. Build: Metrorail and Phased Implementation (specifically T1) provide for the shortest travel times for most analyzed O/D pairs. |
| **Provide Seamless Service** | |
| Transfer Requirements | ▪ Build vs. Baseline: For most O/D pairs, the Build Alternatives require either the same number of transfers as the Baseline Alternative or fewer transfers.<br>▪ Build vs. Build: For the O/D pairs selected for analysis, trips on Metrorail generally require the fewest number of transfers. |
| **Improve the Amenities of Existing Transit Service** | |
| General | ▪ Build vs. Baseline: The Build Alternatives result in improved headways, hours of operation, and access to transit. For most travel markets, the Build Alternatives result in improved travel times and fewer transfers, as compared to the Baseline Alternative.<br>▪ Build vs. Build: For most travel markets, Metrorail and Phased Implementation provide the greatest improvement in service over existing transit operations in the corridor. In addition, Metrorail, BRT/Metrorail, and Phased Implementation result in improved off-peak rail frequencies for existing Metrorail riders traveling between the East Falls Church and Stadium Armory Metrorail stations. |
| **Transit Patronage** | |
| Increases in Ridership | ▪ Build vs. Baseline: All Build Alternatives result in increased transit ridership over Baseline conditions.<br>▪ Build vs. Build: By 2025, Metrorail and Phased Implementation (particularly T6/T9) have the highest ridership, including the highest number of new riders. Transit-related growth associated with allowed density bonuses would result in even higher ridership for these alternatives. |
| **Provide Improved Service In the near term** | |
| General | ▪ Build vs. Baseline: All Build Alternatives would improve levels of service, capacity, and access to express-like and line-haul transit service in the corridor faster than the Baseline Alternative.<br>▪ Build vs. Build: BRT and Phased Implementation would improve service in the corridor more quickly than other Build Alternatives. Phased Implementation, however, builds on these improvements and continues to provide service enhancements in subsequent phases, ultimately providing the same benefits as Metrorail. |

Though not specifically identified as an objective for Goals 1 and 2, the ability to maintain service during an emergency, or disruption along the roadway or rail line, will influence the overall success of an alternative in improving transportation service and increasing transit ridership. As discussed in Section 3.7 for the Metrorail or Phased Implementation Alternative, in the event of an emergency or operational problem in Tysons Corner, it would be more difficult to maintain rail service with Alignment T4 than for the other alignments, because of Alignment T4's divergent, single-track configuration. For this alignment, a disruption along one of the single tracks in the core of Tysons Corner would shut down service to two stations. It would be necessary to bus patrons to and from nearby stations to maintain service.

### 10.1.2 GOAL 3: SUPPORT FUTURE DEVELOPMENT

Because the corridor is growing at such a rapid rate, one goal of the Dulles Corridor Rapid Transit Project is to provide transportation support for the development associated with this growth. This support could entail providing alternate modes of access to concentrations of development or activity centers, or it could involve using the transportation system as an incentive to focus or concentrate future development in specific locations. The end result is to foster sustainable land use patterns that are accessible by a variety of modes, including walking, transit, and the automobile. Accordingly, alternatives under consideration were assessed to determine how well they provide access to existing and planned activity centers and how well they support development plans. The specific objectives for Goal 3 are outlined in Table 10.1-7.

**Table 10.1-7: Objectives for Goal 3**

| Goal 3 – Support Future Development |
|---|
| ▪ Provide improved accessibility to existing and planned activity centers in the corridor and the region.<br>▪ Provide transit service that supports and is consistent with the character of the existing and future land use and development.<br>▪ Provide stations that are compatible with the character of the surrounding neighborhoods and encourage transit use. |

#### 10.1.2.1 Improve Accessibility to Existing and Planned Activity Centers

The major corridor activity centers, as identified in Chapter 1, are Falls Church, Tysons Corner, Reston, Herndon, Dulles Corner, Dulles Airport, and the emerging center in eastern Loudoun County.

Because the Baseline Alternative includes transit and highway improvements designed to improve travel conditions in the Dulles Corridor, it would offer some improved accessibility between activity centers in the corridor. Overall, however, this alternative would do little to improve accessibility between activity centers in the corridor and between the corridor and the Washington metropolitan region's core.

In general, each of the Build Alternatives would improve accessibility between corridor activity centers and between the corridor and the regional core. Each alternative would connect directly to the region's rapid transit system and, with the exception of Alignments BRT 2 and BRT 3, would include stations or stops at each of the corridor activity centers. BRT 2 and BRT 3 would not include a station or stop at Route 28, and therefore, would not provide access to Dulles Corner, an emerging activity center with a substantial amount of planned mixed-use development.

One measure that reflects the level of accessibility at activity centers provided by each alternative is the potential amount of population and employment within a half-mile of each proposed station or stop. The increases in these amounts over the Baseline Alternative are summarized by activity center in Tables 10.1-8 and 10.1-9. Totals reflect the growth potential of each station area based on analysis of the baseline employment and population projections in 2025 and application of allowable density bonuses associated with each station area. These totals do not reflect definitive levels of future development. For Phased Implementation, the density bonuses allowed for Metrorail would be applicable in all station areas as soon as a full funding grant agreement that includes eventual construction of rail is executed.

**Table 10.1-8: Increase in Station Area Population at Corridor Activity Centers over Baseline Alternative (2025)**

| | BRT | | | Metrorail | | | BRT/Metrorail | Phased Implementation |
|---|---|---|---|---|---|---|---|---|
| | BRT 1 | BRT 2 | BRT 3 | T1 | T6/T9 | T4 | BRT 1/T4 | T4 |
| Tysons Corner | 0 | 0 | 0 | 2,376 | 6,473 | 8,887 | 8,887 | 8,887 |
| Reston | 12,999 | 12,999 | 6,291 | 14,624 | 14,624 | 14,624 | 12,999 | 14,624 |
| Herndon | 1,877 | 1,877 | 0 | 2,257 | 2,257 | 2.257 | 1,868 | 2,257 |
| Dulles Corner | 8,512 | 0 | 0 | 9,643 | 9,643 | 9,643 | 8,512 | 9,643 |
| Dulles Airport | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Eastern Loudoun | 1,108 | 1,108 | 1,108 | 2,979 | 2,979 | 2,979 | 1,108 | 2,979 |
| TOTAL | 24,496 | 15,984 | 7.399 | 31,879 | 35,976 | 38,390 | 33,374 | 38,390 |

Though only one representative alignment is shown for BRT/Metrorail and Phased Implementation, these alternatives would have a range of values, depending on the selected alignments.
Population at Tysons Corner rail stations are for area within 1,600 feet of proposed station.

**Table 10.1-9: Station Area Employment at Corridor Activity Centers (2025)**

| | BRT | | | Metrorail | | | BRT/Metrorail | Phased Implementation |
|---|---|---|---|---|---|---|---|---|
| | BRT 1 | BRT 2 | BRT 3 | T1 | T6/T9 | T4 | BRT 1/T4 | T4 |
| Tysons Corner | 0 | 0 | 0 | 15,548 | 17,717 | 20,464 | 20,464 | 20,464 |
| Reston | 3,606 | 3,606 | 665 | 8,153 | 8,153 | 8,153 | 3,606 | 8,153 |
| Herndon | 2,558 | 2,558 | 0 | 3,475 | 3,475 | 3,475 | 2,558 | 3,475 |
| Dulles Corner | 18,784 | 0 | 0 | 21,543 | 21,543 | 21,543 | 18,784 | 21,543 |
| Dulles Airport | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Eastern Loudoun | 1,808 | 1,808 | 1,808 | 11,835 | 11,835 | 11,835 | 1,808 | 11,835 |
| TOTAL | 26,756 | 7,972 | 2,473 | 60,554 | 62,723 | 65,470 | 47,220 | 65,470 |

Though only one representative alignment is shown for BRT/Metrorail and Phased Implementation, these alternatives would have a range of values, depending on the selected alignments.
Jobs at Tysons Corner rail stations are for area within 1,600 feet of proposed station.

The Metrorail, BRT/Metrorail, and Phased Implementation alternatives have the potential to provide access to a much larger amount of population and employment than the BRT Alternative. This difference is primarily related to the number and location of stations in Tysons Corner. The Metrorail, BRT/Metrorail, and Phased Implementation alternatives have three to six stations in Tysons Corner, but the BRT Alternative only has one station or stop. Moreover, the one BRT station or stop is located on the north edge of Tysons Corner, whereas the Metrorail stations are located in the heart of Tysons Corner.

Another reason for the difference in potential population and employment levels across Build Alternatives is that larger density bonuses are associated with Metrorail than with BRT. In most activity centers, the comprehensive plans in Fairfax and Loudoun counties allow for increased development in station vicinities, irrespective of mode. However, both counties allow for higher levels of development at rail stations than at BRT stations on the assumption that rail has greater ability to support increased densities. In Tysons Corner, development increases are allowed for rail stations only, not BRT stations or stops.

For the BRT Alternative, BRT 1 provides the greatest level of accessibility, primarily because it includes a station at Route 28. BRT 3 provides the least amount of accessibility, because no density increases are associated with BRT stops at Wiehle Avenue and Herndon-Monroe. Moreover, these stops only provide direct access to one side of the Dulles Toll Road, whereas BRT 1 and BRT 2 provide pedestrian connections from median stations to both sides of the Toll Road.

For the Metrorail, BRT/Metrorail, and Phased Implementation alternatives, the station area employment and population are largest for Alignment T4 because it includes four stations in the core of Tysons Corner, rather than the one to two included in Alignments T1, T6, and T9. However, because the four core stations on Alignment T4 are one-way, this alignment does not necessarily provide better access through Tysons Corner than Alignments T6 and T9. For example, to be within reasonable walking distance of his job on the inbound trip, a Reston resident that worked north of Tysons Central A Station would have to travel from Reston to Tysons East Station, then transfer to a train traveling in the opposite direction, exiting at Tysons Central A Station. As a result, transit would not be an attractive travel mode for this traveler. For the two-way stations on Alignments T1, T6, and T9, this kind of transfer is not required.

#### 10.1.2.2 Consistency with Existing and Planned Development

The Baseline Alternative is consistent with existing and planned land use; it does not introduce any elements that would alter or conflict with the character of planned development. However, this alternative is not consistent with local comprehensive plans because it does not include rapid transit in the Dulles Corridor. The comprehensive plans for Fairfax and Loudoun counties, as well as various smaller planning efforts for Herndon and Dulles Corner, include rapid transit in the Dulles Corridor as a critical element in shaping and supporting future development.

The Build Alternatives are generally consistent with existing and planned land use in the Dulles Corridor. Introduction of either BRT or Metrorail into the Dulles Connector Road, the DAAR, the Dulles Toll Road, Dulles Airport, and the Dulles Greenway is consistent with the existing transportation use of these facilities. Most stations and stops are located in areas of existing or planned commercial development or future high-density residential use, and many make use of existing park-and-ride facilities. Those stations that do not make use of existing park-and-ride facilities would be incorporated into planned transit-oriented developments, which are intended to include rapid transit stations. Neighborhoods would link to stations via existing sidewalks and pedestrian connections, so few disruptions to existing communities would occur. There is little difference between alternatives in terms of consistency with land use.

Overall, the Build Alternatives are consistent with local comprehensive plans. As noted, the comprehensive plans specifically include rapid transit improvements in Dulles Corridor as future transportation elements, and also include land use guidelines that would enhance the use of the transit system through transit-oriented development. The development pattern of the corridor, particularly in the vicinity of stations, is intended to become more transit-friendly as substantial growth continues.

The Metrorail, BRT/Metrorail, and Phased Implementation alternatives are more consistent with development plans than the BRT Alternative, particularly in Tysons Corner. The *Fairfax County Comprehensive Plan* specifically identifies a preference for rail in Tysons Corner, and includes development guidelines to support rail stations at particular locations in the heart of Tysons Corner. The plan does not include development bonuses or guidelines for BRT.

For the BRT Alternative, BRT 2 and BRT 3 are inconsistent with future plans because they do not include a station or stop at Route 28. Proposed development in Dulles Corner has been designed on the assumption that rapid transit connections would be available at that location in the future. The planned road network in this activity center is not designed to support the high-intensity land uses in the absence of transit.

BRT 3 is least consistent with comprehensive plans because it also does not include median stations at Wiehle Avenue or Herndon-Monroe. The stops proposed for these locations are inconsistent with planning efforts because they do not provide access to both sides of the Dulles Toll Road.

The four Metrorail alignments are consistent with comprehensive plans for Fairfax and Loudoun counties. Because it would include four stations in the core of Tysons Corner, Alignment T4 would have greater potential to foster the high level of development planned in Tysons Corner. Though, as discussed earlier, the one-way stations would affect the level of accessibility provided by the alignment, they may not affect the potential for increased development in the vicinity of the stations.

It is important to note that Alignment T9 would conflict with VDOT's planned transportation improvements along Route 123 and Route 7 in Tysons Corner, and at the Interstate 495/Route 123 interchange. The Alignment T9 design option would not conflict with the I-495/Route 123 interchange improvements because its profile would be identical to that for Alignments T1 and T6; however, this design option would still conflict with VDOT's planned improvements for the Route 123/Route 7 interchange.

The proposed site for the BRT Maintenance and Storage Facility (Site 14) and the three potential sites for the Metrorail S&I Yard (Sites 7, 15, and 20) are consistent with existing land use, because all sites are currently undeveloped and located in areas that are primarily industrial in nature. Site 20 is the most consistent with future land use plans for the potential yard sites; this site is zoned for industrial development, and though a preliminary application for a subdivision on part of the site has been approved by the county, the plat submitted for the first phase of the project is inactive. Site 7 is potentially inconsistent with Loudoun County plans, because the site is partially within a proposed Transit-Related Employment Center; however, the site is currently zoned industrial. Sites 14 and 15 are located on Dulles Airport property, partially on land designated as buffer zone. Implementation of BRT or Metrorail facilities on these sites would be inconsistent with the current airport land use plan, and FAA has indicated that a rail yard on Site 15 would not be desirable use of airport land. Use of Site 14 or 15 would require MWAA Board action to amend the plan, and MWAA would have to seek FAA approval for the release of any property currently dedicated for airport purposes. If Site 14 or 15 is selected, under the Federal Revenue Diversion Policy FAA will be required to publish the intent to release this property in the Federal Register for 30 days to solicit public comments. MWAA would be required to obtain compensation of fair market value for the property.

#### 10.1.2.3 Summary

The relative performance of alternatives with respect to Goal 3 is summarized in Table 10.1-10. The results for both the "Build vs. Baseline" and "Build vs. Build" analyses are identified.

**Table 10.1-10: Summary of Evaluation Results for Goal 3**

| **Improve Accessibility at Activity Centers** | |
|---|---|
| General | ▪ Build vs. Baseline: The provision of rapid transit would improve accessibility in the corridor more than the improvements in the Baseline Alternative.<br>▪ Build vs. Build: Except for BRT 2 and 3, the Build Alternatives connect to all major activity centers in the corridor. BRT 2 and 3 do not provide a connection to Dulles Corner at Route 28. |
| Population and Employment within Station Areas | ▪ Build vs. Baseline: Because plans call for future development to be concentrated in the vicinity of transit stations, the Build Alternatives would provide direct access for more residents and employees than the Baseline Alternative.<br>▪ Build vs. Build: Metrorail and Phased Implementation provide access for more residents and employees than BRT and BRT/Metrorail because they include more stations, and allowable densities are higher for rail stations than BRT stations. Alignment T4 has greater station area coverage than Alignments T6 and T9, but does not necessarily provide better access because |

| | |
|---|---|
| | stations are one-way. |
| **Consistency with Existing and Planned Development** | |
| Existing and Planned Land Use | ▪ Build vs. Baseline: In general, both the Baseline Alternative and the Build Alternatives are consistent with existing and planned land uses. Yard Sites 7, 14, and 15 are potentially inconsistent with planned land use.<br>▪ Build vs. Build: The Build Alternatives are equally consistent with existing and planned land uses. Alignment T4 has the greatest development potential in Tysons Corner. |
| Comprehensive Plans | ▪ Build vs. Baseline: The Baseline Alternative is not consistent with comprehensive plans because it does not include rapid transit improvements in the Dulles Corridor.<br>▪ Build vs. Build: Metrorail, BRT/Metrorail, and Phased Implementation are more consistent than BRT because they include rail stations in Tysons Corner. BRT 2 and 3 are inconsistent with plans because they do not include a station at Route 28. In addition, BRT 3 is inconsistent with plans because it does not include median stations at Wiehle Avenue or Herndon-Monroe. |
| Other Plans | ▪ T9 is not consistent with VDOT's improvement plans for Route 123, Route 7, or the I-495/Route 123 interchange. T9 Design Option is consistent with the I-495/Route 123 interchange plans, but not the Route 123 and Route 7 plans. |

### 10.1.3 GOAL 4: SUPPORT ENVIRONMENTAL QUALITY

Goal 4 is intended to examine the extent to which the alternatives under consideration for the Dulles Corridor Rapid Transit Project affect various elements of the natural and human environment. Alternatives were evaluated to determine their relative effectiveness in contributing to air quality improvements, while minimizing negative effects on communities, natural resources, and cultural resources. Specific objectives for Goal 4 are outlined in Table 10.1-11.

**Table 10.1-11: Objectives for Goal 4**

| Goal 4 – Support Environmental Quality |
|---|
| ▪ Contribute to the attainment of regional air quality standards.<br>▪ Minimize negative impacts to traffic patterns.<br>▪ Minimize negative impacts on neighborhoods and residential land uses.<br>▪ Minimize negative impacts to ecologically sensitive areas.<br>▪ Minimize negative impacts to historic and cultural resources.<br>▪ Minimize negative visual and aesthetic impacts. |

#### 10.1.3.1 Air Quality

Air quality effects are discussed in Section 4.6. Emissions modeling and analysis conducted for the Baseline Alternative and the Build Alternatives show that all alternatives would have reduced levels of carbon monoxide emissions compared to existing conditions. This anticipated reduction is primarily attributable to improvements in vehicle emission rates over the next 25 years.

All Build Alternatives result in pollutant levels that are similar to those expected for the Baseline Alternative. The difference between alternatives is negligible. All predicted pollutant levels are below those allowed under federal air quality standards.

No additional air quality impacts are expected from proposed maintenance and storage facilities under any of the Build Alternatives.

#### 10.1.3.2 Traffic Impacts

Based on the traffic analyses presented in Chapter 6, the implementation of any of the Build Alternatives, and, specifically the provision or expansion of park-and-ride and Kiss & Ride facilities, would result in increased traffic on local roadways around stations (or stops). However, the Build Alternatives are not expected to substantially affect the operation of regional highway facilities or roadways outside of station (or stop) areas.

Among the Build Alternatives, the Metrorail and Phased Implementation alternatives generally result in the greatest localized traffic impacts. Implementation of these alternatives, and the resultant demand for parking at stations, would cause intersection level of service (LOS) and delay to worsen at the majority of key intersections in Tysons Corner, Reston, and Herndon, as compared to the Baseline Alternative. Local intersections around 6 of the 13 stations proposed under the Metrorail and Phased Implementation alternatives are forecast to operate at unacceptable and/or failing levels of service for either one or both peak periods. Although traffic conditions at many intersections in Tysons Corner would be poor in 2025 without the project, conditions on the local road network around stations without parking or Kiss & Ride facilities show marginal improvements under the Metrorail and Phased Implementation alternatives because many travelers who would use these roads are expected to be diverted to transit.

The BRT Alternative is not expected to generate as much traffic in most station and stop areas as the Metrorail and Phased Implementation alternatives. However, east of Route 28, BRT 3 would generally result in higher travel delay than the other BRT alignments, because of (1) the effect of BRT vehicles mixing with general traffic at the Herndon-Monroe and Wiehle Avenue stops, and (2) the availability of free parking at stops (for <u>stations</u> at Herndon-Monroe and Wiehle Avenue, there would be a fee for parking).

The traffic effects discussed above were determined using MWCOG's regionally approved land use forecasts. As discussed in earlier sections, a supplementary travel demand analysis was conducted to determine the transportation effects associated with the station area development increases permitted by the *Fairfax County Comprehensive Plan* and the *Loudoun County Revised General Plan*. In general, for all Build Alternatives, transit-related growth in station areas is expected to increase the use of transit and alternate modes in the corridor over what is projected under the regionally approved forecasts. The potential development increases would also increase the total number of vehicle trips, creating localized congestion in station areas; however, the new, transit-oriented urban form will help to increase overall mobility in the corridor, the counties, and the region. The Metrorail and Phased Implementation alternatives will generally result in the greatest increases in both transit use and auto travel. Anticipated increases in traffic are not expected to have air quality impacts.

At some locations in Tysons Corner, transit-related growth for Metrorail and Phased Implementation could result in lower intersection volumes than those anticipated under the regionally approved land use forecasts. This result is primarily a product of the different development mix permitted in Tysons Corner station areas under the *Fairfax County Comprehensive Plan*. The Comprehensive Plan allows for more residential development in station areas, replacing some of the retail and office development assumed in the regional forecasts. The Comprehensive Plan also concentrates development very close to the transit station areas. As a result, more people are expected to travel to and from Tysons Corner by walking to transit.

#### 10.1.3.3 Community Effects

As discussed in Section 3.2, community effects were assessed relative to a variety of factors, including community cohesion, noise and vibration, physical intrusions, access changes, displacements, safety, and property values.

The Baseline Alternative would have few effects on communities in the corridor. The most notable effect would be that the Baseline Alternative does not provide residents with greater mobility benefits than the Build Alternatives. The Build Alternatives would have greater impacts on corridor neighborhoods than Baseline Alternative, but they would also offer greater benefits related to mobility improvements and increased property values in station areas.

The Metrorail and Phased Implementation alternatives would generally have more substantial adverse impacts on communities than the BRT and BRT/Metrorail alternatives. Most of these effects are related to noise increases, changes in the visual environment, localized increases in traffic congestion, parking spillover, and business displacements. These effects are summarized in Table 10.1-12.

Note that the ultimate effects on neighborhoods under the Phased Implementation Alternative are the same as those for the Metrorail Alternative. The initial phases of Phased Implementation (BRT, Metrorail through Tysons Corner) would not affect neighborhoods that are not affected in the final phase (Metrorail to Loudoun County); some neighborhoods would just be affected sooner. For example, the two Mid-Corridor neighborhoods affected under the BRT phase of the Phased Implementation Alternative would also be affected under the final phase, but they would be affected earlier by Phased Implementation than they would if only the Metrorail Alternative were developed.

**Table 10.1-12: Summary of Community Effects**

| | **BRT** | **Metrorail and Phased Implementation** | **BRT/Metrorail** |
|---|---|---|---|
| Noise Effects | 6 neighborhoods<br>2 – Orange Line Connection<br>2 – Tysons Corner<br>2 – Mid-Corridor | 12 to 15 neighborhoods<br>3 – Orange Line Connection<br>4 to 6 – Tysons Corner<br>5 – Mid-Corridor<br>1 – Loudoun County | 9 to 10 neighborhoods<br>3 – Orange Line Connection<br>4 to 5 – Tysons Corner<br>2 – Mid-Corridor |
| Visual Effects | None | 2 to 5 neighborhoods in Tysons Corner<br>1 neighborhood in Loudoun County | 2 to 5 neighborhoods in Tysons Corner |
| Traffic Effects | Increased traffic congestion in neighborhoods near Spring Hill Road Station and along Sunrise Valley in Reston | Increased traffic congestion in neighborhoods near Tysons West Station and along Sunrise Valley in Reston | Increased traffic congestion in neighborhoods near Tysons West Station and along Sunrise Valley in Reston |
| Parking Effects | Spillover possible near Herndon-Monroe and Wiehle Avenue stations for BRT 2 and 3 | Spillover possible near Tysons East, Herndon-Monroe, and Wiehle Avenue stations | Spillover possible near Tysons East. Also BRT 2 and 3 could result in spillover near the Herndon-Monroe and Wiehle Avenue stations. |
| Residential Displacements | None | None | None |
| Business Displacements | Two potential in Loudoun County | Metrorail: Two to six in Tysons Corner<br>Phased Implementation: Two to eight in Tysons Corner and two potential in Loudoun County | Two to eight in Tysons Corner and two potential in Loudoun County |

Though all alternatives result in increased congestion for neighborhoods along Sunrise Valley Drive in Reston, Metrorail (and the final stage of Phased Implementation) would generally have more substantial impacts than BRT and BRT/Metrorail because greater demand at the median stations for this alternative and higher development potential for rail result in greater localized traffic volumes.

For the Metrorail and Phased Implementation alternatives, Alignment T4 is expected to have the largest effect on communities because it extends along Westpark Drive, in proximity to several residential developments. The addition of aerial structure along this road would result in both visual and noise impacts on these communities. This alignment also has the potential to create a perceived isolation effect at one community along Westpark Drive, and could affect a temporary church along this road. There would be minor differences between the effects associated with Alignments T1, T6, and T9.

It is possible that the proposed S&I Yard at Site 20 could have noise and visual impacts on a community north of the site that is currently under development. The possible development of both a BRT Maintenance and Storage Facility and an S&I Yard on this site for Phased Implementation would not result in substantially different community effects than development of the S&I Yard alone. The other yard sites would not have effects on communities.

For the BRT Alternative, community impacts would be the same across alternatives, except for effects associated with the Route 28 Station. BRT 1 would affect a soccer field, which would be converted for the northern station facilities at Route 28 as part of a private development proffer. BRT 2 and BRT 3 would not affect this community facility, but the absence of the Route 28 Station would likely increase demand at the Herndon-Monroe and Wiehle Avenue stations/stops, possibly resulting in parking spillover within neighborhoods near these stations.

#### 10.1.3.4 Ecologically Sensitive Areas

The anticipated effects on ecologically sensitive areas are discussed in detail in Chapter 4. The Baseline Alternative would not have effects on ecologically sensitive areas that are attributable to the Dulles Corridor Rapid Transit Project. The effects of other transportation improvements and development projects included in the Baseline would be the responsibility of the agencies and jurisdictions implementing those projects.

Overall, the Build Alternatives have minimal potential for long-term effects on ecologically sensitive areas. For those resources that are affected, Metrorail has greater impacts or greater potential for effects. The difference in effects between Metrorail alignments is negligible. Effects associated with the BRT and BRT/Metrorail alternatives mostly occur at station locations shared by the Metrorail Alternative. The BRT Alternative does not have any effects that Metrorail does not, except at the BRT Maintenance and Storage Facility. Accordingly, the Phased Implementation Alternative would not have any effects that differ from those of the Metrorail Alternative; as noted earlier, some of the anticipated effects would just occur sooner, as the initial phases are implemented. BRT 1 has slightly higher potential for effects than BRT 2 and BRT 3 because it includes a station at Route 28. Only minor effects are anticipated at this station. Table 10.1-13 includes a summary of the differences in effects for specific resource areas.

**Table 10.1-13: Summary of Effects on Ecologically Sensitive Areas**

| Resource Area | Relative Effects |
|---|---|
| Wetlands | Metrorail and Phased Implementation would have greater effects on wetlands than BRT and BRT/Metrorail (1.22 acres vs. 0.58 acres), because they have additional wetlands impacts at Dulles Airport and at one of the potential S&I Yard sites. Site 15 would potentially affect 0.62 acres of wetland. There is no difference in impacts between the Metrorail |

| Resource Area | Relative Effects |
|---|---|
| | alignments—that is, each Metrorail alignment has the same level of impact. There is also no difference in impact between the BRT alignments. |
| Streams and Water Quality | Metrorail and Phased Implementation would have greater effects on streams than BRT and BRT/Metrorail because they have additional effects at Dulles Airport. The difference in impacts between the Metrorail alignments is negligible, as is the difference between BRT alignments. |
| Floodplains | Metrorail and Phased Implementation would have greater potential for effects on floodplains than BRT and BRT/Metrorail because they require new bridges at various stream crossings throughout the corridor. At these locations, anticipated effects are minimal.<br>The BRT Maintenance and Storage Facility, the Site 7 Metrorail S&I Yard, and the yard lead for Site 20 would be located in the 100-year floodplain of Broad Run. The BRT facility would not affect the floodplain. The S&I Yard at Site 7 would change the elevation of the floodplain. The amount of increase is not considered significant and the flood risk is minimal. The Site 15 S&I Yard lead and a portion of the site would be located in the 100-year floodplain for Horsepen Run.<br>There is no difference in impacts between Metrorail alignments. BRT 1 would have minor proximity effects in the vicinity of the Route 28 Station. |
| Habitats and Biota | In general, the Build Alternatives would have minimal impacts on aquatic and terrestrial habitat and biota. There are few differences in effects between alternatives. Potential station area impacts at Herndon-Monroe, Route 28, and Route 772 (both options) would be the same for all alternatives except BRT 2 and 3, which don't include stations at Route 28.<br>Metrorail and Phased Implementation have slightly higher potential for effects than BRT and BRT/Metrorail, because they require new bridge piers at various stream crossings throughout the corridor. The Metrorail alignment at the airport and the three S&I Yard sites are also expected to have greater potential for impacts on wildlife habitat and communities, though sufficient habitat would remain to support local species. Sites 15 and 20 for the S&I Yard would have greater potential for effects on terrestrial habitat and wildlife populations than Site 7. |
| Rare, Threatened & Endangered (RTE) Species | BRT and BRT/Metrorail would have no effects on RTE species. Metrorail and Phased Implementation have minimal potential for effects on the wood turtle at Difficult Run. |

#### 10.1.3.5 Parklands and Cultural Resources

The anticipated effects on parklands and cultural resources are discussed in detail in Chapter 3. The Baseline Alternative would not have effects on these resources that are attributable to the Dulles Corridor Rapid Transit Project. The effects of other transportation improvements and development projects included in the Baseline would be the responsibility of the agencies and jurisdictions implementing those projects.

Overall, the Build Alternatives have very few effects on parklands and cultural resources. For those resources that are affected, Metrorail and Phased Implementation generally have the largest number of impacts. There is no difference in effects between Metrorail alignments. The only difference in effects for the BRT alignments is that BRT 2 and BRT 3 would not have noise impacts on an historic resource in Loudoun County that would be affected by BRT 1. For Phased Implementation, some resources that are affected by the initial phases of the project would not be affected after implementation of the final phase (e.g., a historic resource in Loudoun County would initially be affected by noise from BRT operations, but after implementation of Metrorail in Loudoun County, this resource would not be affected). On the other hand, several resources that would not initially be affected would be affected by the final Metrorail phase (e.g., the W&OD Regional Railroad Park would not be affected by BRT operations in the Mid-Corridor, but would later be affected by rail operations). Table 10.1-14 includes a summary of the relative differences in effects for specific resource areas.

#### 10.1.3.6 Visual Quality and Aesthetics

The visual effects associated with the improvements included in the Baseline Alternative are not assessed as part of the analysis for this Draft EIS. Therefore, the Baseline Alternative would not affect visual quality and aesthetics in the corridor.

**Table 10.1-14: Summary of Effects on Parklands and Cultural Resources**

| Resource Area | Relative Effects |
|---|---|
| Parklands and Recreation Areas | BRT and BRT/Metrorail would not affect parklands or recreation areas.<br>Metrorail and Phased Implementation would affect two parklands. At the W&OD Regional Railroad Park, the new bridge for the Metrorail crossing of the park would eliminate the existing "light well" along the trail, creating a "dark tunnel" effect at this location. Increased noise levels would affect the Ash Grove Historic Site. |
| Archaeological Resources | BRT would not affect archaeological resources.<br>For Metrorail, BRT/Metrorail, and Phased Implementation, a tie-breaker station would disturb one archaeological site along the Dulles Connector Road.<br>Metrorail and Phased Implementation also could disturb up to three sites in Loudoun County, if they still exist. Two of these sites were likely destroyed during construction of the Dulles Greenway. |
| Historic Resources | BRT, BRT/Metrorail, and the initial stages of Phased Implementation have noise impacts on two historic resources, one in Reston and the other in Loudoun County. The historic nature or use of these sites would not be adversely affected. BRT 2 and 3 would not affect the resource in Loudoun County.<br>Metrorail also has noise impacts on two historic resources. It would affect the same site in Reston that BRT affects. (This resource would continue to be affected by Phased Implementation.) Metrorail and the final stage of Phased Implementation would also affect the Ash Grove Historic Site in Tysons Corner. The historic nature or use of these sites would not be adversely affected. |

The Metrorail and BRT/Metrorail alternatives would have greater visual impacts than the BRT Alternative, due to aerial structures in Tysons Corner, as well as removal of landscaping along the Dulles Connector Road and the DAAR, and the addition of new bridges over recreational resources. Alignment T4 would have much greater visual impacts than Alignments T1, T6, and T9 because of the leg along Westpark Drive in Tysons Corner. The addition of aerial rail structure to this narrow, tree-lined street would constitute a substantial change from the current visual quality of the area. Moreover, residential viewers along this route would be highly sensitive to changes in the visual environment. For Phased Implementation, the visual effects would change through time, as each successive phase of the project is implemented. The most substantial effects would be associated with the implementation of rail through Tysons Corner.

Removal of vegetation for the Metrorail S&I Yard and its yard lead at Site 20 would potentially have substantial visual impacts on future residents of the development under construction north of the proposed yard site. For Phased Implementation, development of both a BRT Maintenance and Storage Facility and a Metrorail S&I Yard on Site 20 would not have more substantial visual effects than those for the S&I Yard alone.

In general, the BRT alignments would not have substantial visual impacts in the corridor. The only substantial impact is associated with the multi-level station proposed at Reston Parkway for BRT 3. This impact is not considered adverse because although the station would be a dominant visual element in the middle of the DAAR, it would not be inconsistent with tall office structures on either side of the Dulles Toll Road.

#### 10.1.3.7 Summary

The relative performance of alternatives with respect to Goal 4 is summarized in Table 10.1-15. The results for both the "Build vs. Baseline" and "Build vs. Build" analyses are identified for all objectives except air quality, for which all alternatives perform the same.

**Table 10.1-15: Summary of Evaluation Results for Goal 4**

| Area of Effect | Summary of Relative Effects |
|---|---|
| Air Quality | All alternatives, including the Baseline Alternative, are an improvement over the existing condition. Differences between carbon monoxide levels for each alternative are negligible. |
| Traffic Impacts | ▪ <u>Build vs. Baseline</u>: Under the Build Alternatives, travelers would experience more travel delay in the vicinity of stations and stops than they would under the Baseline Alternative.<br>▪ <u>Build vs. Build:</u> Metrorail and Phased Implementation generally result in the greatest localized traffic impacts due to increased levels of demand at the stations. There is no difference in effect between the four rail alignments. BRT 3 results in slightly higher levels of delay than BRT 1 and BRT 2 at station or stop areas east of Route 28. Transit-related growth associated with density bonuses at stations generally would increase localized traffic volumes as well as the use of alternative modes for all alternatives. Metrorail and Phased Implementation would result in the greatest increases in vehicle traffic and transit use. |
| Communities | ▪ <u>Build vs. Baseline</u>: The Baseline Alternative would not have negative effects on communities, but would not provide the mobility benefits associated with the Build Alternatives.<br>▪ <u>Build vs. Build:</u> Metrorail and Phased Implementation have greater effects on communities than BRT and BRT/Metrorail. Alignment T4 has more impacts on communities than the other rail alignments. BRT 1 affects a community facility at Route 28. BRT 2 and 3 do not affect this facility, but because they do not include a station at Route 28 they have potential parking impacts in neighborhoods near Herndon-Monroe and Wiehle Avenue. |
| Ecologically Sensitive Areas | ▪ <u>Build vs. Baseline</u>: The Baseline Alternative would not affect ecologically sensitive areas.<br>▪ <u>Build vs. Build:</u> In general, the Build Alternatives have minimal potential for long-term effects on ecologically sensitive areas. Metrorail and Phased Implementation have greater potential for impacts than BRT and BRT/Metrorail, especially at Site 15 for the S&I Yard and along the yard lead for Site 20. BRT and BRT/Metrorail would not have any effects that Metrorail would not also have. For Phased Implementation these effects would occur sooner than they would if only Metrorail were implemented. BRT 1 has slightly higher potential for effects than BRT 2 and 3 because it includes a station at Route 28. |
| Parklands and Cultural Resources | ▪ <u>Build vs. Baseline</u>: The Baseline Alternative would not affect parklands and cultural resources.<br>▪ <u>Build vs. Build:</u> The Build Alternatives would have very few effects on parklands and cultural resources. For those resources that are affected, Metrorail and Phased Implementation would generally have the largest number of impacts. |
| Visual Quality and Aesthetics | ▪ <u>Build vs. Baseline</u>: The Baseline Alternative would not have visual effects.<br>▪ <u>Build vs. Build:</u> Metrorail and Phased Implementation would have the greatest visual effects, due to aerial structures in Tysons Corner, the removal of landscaping along the Dulles Connector Road and the DAAR, and the addition of new bridges over recreational areas. Because of the leg along Westpark Drive, Alignment T4 would have the greatest visual impacts of all the Metrorail alignments. For the BRT Alternative, only BRT 3 would have a substantial visual impact, due to the multi-level station at Reston Parkway. |

### 10.1.4 GOAL 5: PROVIDE COST EFFECTIVE, ACHIEVABLE TRANSPORTATION SOLUTIONS

While each of the Build Alternatives provide varying degrees of benefits in terms of improving mobility, supporting future development, and preserving environmental quality, they also come with some financial costs.

Chapter 6 summarizes the estimated operations and maintenance (O&M) costs for each of the Build Alternatives, while Chapter 8 presents the capital costs and proposed revenues for each alternative. The specific objectives identified for Goal 5 are shown in Table 10.1-16.

Capital and operating cost estimates are shown below in escalated dollars. However, cost effectiveness measures are presented for the forecast year 2025 in constant 2001 dollars. Constant dollars are used for these measures to provide a more consistent basis for comparing costs at a given point in time (in this case, 2025).

**Table 10.1-16: Objectives for Goal 5**

| Goal 5 – Provide Cost-Effective, Achievable Transportation Solutions |
|---|
| ▪ Develop transportation improvements that are consistent with the funding and financial capacity of the region.<br>▪ Minimize project-operating costs.<br>▪ Optimize cost-effectiveness. |

### 10.1.4.1 Consistency with the Funding and Financial Capacity of the Region

The projected capital costs for the Build Alternatives are shown (in year of expenditure dollars) in Table 10.1-17.

**Table 10.1-17: Capital Costs (Year of Expenditure Dollars in Millions)**

| | BRT | | | Metrorail | | | | BRT/Metrorail | Phased Implementation |
|---|---|---|---|---|---|---|---|---|---|
| | BRT 1 | BRT 2 | BRT 3 | T1 | T6 | T9 | T4 | BRT 1/T6 | BRT 1 to T6 |
| Total | $481.4 | $349.1 | $342.7 | $2,937.3 | $3,101.3 | $2,982.6 | $3,080.4 | $1,454.1 | $3,295.4 |

As discussed in Chapter 8, proposed local revenue sources for the Dulles Corridor Rapid Transit Project are sufficient to fund construction of any of the Build Alternatives with the proposed level of federal financial assistance. Furthermore, the WMATA Compact requires that member jurisdictions fully meet their obligation to maintain operations of the regional transit system, thus ensuring that adequate capacity exists to support O&M requirements. The project's financial plan will provide a more detailed analysis of its sponsors' financial capacity.

### 10.1.4.2 Minimize Project Operating Costs

Section 6.3.4 summarizes the annual operating costs of each of the Build Alternatives in the forecast year. Table 10.1-18 presents the 2025 incremental O&M costs for each Build Alternative and alignment over the Baseline Alternative, in year of expenditure dollars. As noted before, in 2025, the Phased Implementation Alternative would be identical to the Metrorail Alternative. Only one representative alignment is shown for Phased Implementation, although the alternative would have a range of costs, depending on the alignments selected for the initial phases.

**Table 10.1-18: Incremental Annual O&M Costs for 2025 (Year of Expenditure Dollars in Millions)**

| | BRT | | | Metrorail | | | BRT/Metrorail | Phased Implementation |
|---|---|---|---|---|---|---|---|---|
| | BRT 1 | BRT 2 | BRT 3 | T1 | T6/T9 | T4 | BRT 1/T4 | T4 |
| Total | $54.1 | $55.0 | $64.2 | $176.5 | $179.4 | $184.2 | $114.9 | $184.2 |

As the table shows, each of the BRT alignments carries lower incremental O&M costs than the other Build Alternatives. BRT 1 and BRT 2 have the lowest costs; BRT 3 has higher O&M costs.

The Metrorail and Phased Implementation O&M costs are more than three times higher than the costs associated with BRT 1 and BRT 2, and 50 percent higher than those for the BRT/Metrorail Alternative. But, as demonstrated in Sections 6.3.2 and 6.3.3, capacity and ridership for Metrorail and Phased Implementation are significantly higher than for the other alternatives.

One way of scaling operating costs to compare the efficiency of service across the Build Alternatives is to divide annual O&M costs for each by the number of annual passenger miles projected for the corresponding alternative. Table 10.1-19 provides O&M costs per passenger mile for each of the Build Alternatives.

**Table 10.1-19: O&M Costs Per Passenger Mile in 2025 (2001 Dollars)**

| | Baseline | BRT | | | Metrorail | | | BRT/Metrorail | Phased Implementation |
|---|---|---|---|---|---|---|---|---|---|
| | | BRT 1 | BRT 2 | BRT 3 | T1 | T6/T9 | T4 | BRT 1/T4 | T4 |
| Total | $0.274 | $0.264 | $0.263 | $0.263 | $0.268 | $0.270 | $0.271 | $0.267 | $0.271 |

These cost measures indicated that, in terms of the total Metrorail system, all of the Build Alternatives generate similar costs per passenger mile. Moreover, these costs are less than those generated for the Baseline Alternative.

For the Metrorail and Phased Implementation alternatives, an important consideration in the O&M costs is the location of the S&I Yard. Because the three potential yard sites would have yard leads of varying lengths, the costs associated with non-revenue service would be different for each site. As explained in Chapter 2, non-revenue service consists of the unproductive time or miles a vehicle spends running between the storage facility and the beginning of the route, and vice versa at the end of the day.

The O&M costs presented above were determined using a standard factor to calculate the costs associated with non-revenue service; therefore, the Metrorail and Phased Implementation O&M costs in Tables 10.1-18 and 10.1-19 are not associated with a particular yard site. A supplementary analysis was conducted to determine the non-revenue hours, miles, and costs associated with the three potential S&I Yard locations. These costs are summarized in Table 10.1-20.

**Table 10.1-20: Daily Non-Revenue Vehicle Hours, Miles, and Costs for Alternative S&I Yard Sites**

| S&I Yard Site | Daily Non-Revenue Vehicle Hours | Daily Non-Revenue Vehicle Hour Costs* | Daily Non-Revenue Vehicle Miles | Daily Non-Revenue Vehicle Mile Costs* | Total Daily Non-Revenue Costs* |
|---|---|---|---|---|---|
| Site 7 | 57.39 | $2,463 | 1,395 | $2,093 | $4,556 |
| Site 15 | 96.59 | $4,146 | 2,528 | $3,792 | $7,938 |
| Site 20 | 96.25 | $4,131 | 2,172 | $3,258 | $7,389 |

*Costs based on per unit cost from operating cost model updated using 2001 costs.

The non-revenue service costs for Sites 15 and 20 would be almost double the costs for Site 7 due to their much longer yard leads. Overall, Site 15 would have the highest non-revenue costs of the three yard sites. This site would have a lengthy yard lead, and because it joins the mainline east of the Route 606 interchange, vehicles would have to travel a greater distance to reach the Route 772 Station at the end of the line.

#### 10.1.4.3 Optimize Cost Effectiveness

This section assesses the relative costs and benefits for the proposed alternatives by comparing total project costs and forecast ridership. Project cost effectiveness is a critical measure for evaluating the "return" of a proposed transit investment.

There are several conventional measures for generating the cost effectiveness of major transit capital investments. For the Dulles Corridor Rapid Transit Project, project sponsors used the incremental cost per incremental rider to measure cost effectiveness. This measure reflects the additional capital and O&M costs required to carry each "new rider" attracted to the regional system due to the presence of the proposed transit investment. As such, the cost per new rider is a comparison of annualized baseline costs and ridership to those associated with each Build Alternative. Table 10.1-21 below presents the cost per new rider for each Build Alternative. Note that in this case, the Phased Implementation Alternative performs differently than the Metrorail Alternative because the cost-effectiveness measure accounts for capital costs, which are higher for Phased Implementation than Metrorail.

**Table 10.1-21: Cost Per New Rider in 2025 (2001 Dollars)**

| | BRT | | | Metrorail | | | | BRT/Metrorail | Phased Implementation |
|---|---|---|---|---|---|---|---|---|---|
| | BRT 1 | BRT 2 | BRT 3 | T1 | T6 | T9 | T4 | BRT 1/T4 | BRT 1 to T4 |
| Total | $16.62 | $15.24 | $16.84 | $24.76 | $25.34 | $24.63 | $26.40 | $20.57 | $28.17 |

Table 10.1-21 demonstrates that the BRT Alternative is the most cost effective of the Build Alternatives, in terms of attracting new riders. BRT 2 is the most cost-effective alignment.

In corridors where transit service is very good and ridership is relatively strong before implementation of a major transit capital investment, the number of new riders attracted to that transit system might not be very high. However, existing transit riders benefit greatly from the improved service levels, access, and travel times generated by the implementation of a new high-capacity transit system. Table 10.1-22 presents the incremental cost per benefiting rider (i.e., all riders carried on the given alternative) for each of the proposed alignments.

**Table 10.1-22: Cost Per Benefiting Rider in 2025 (2001 Dollars)**

| | BRT | | | Metrorail | | | | BRT/Metrorail | Phased Implementation |
|---|---|---|---|---|---|---|---|---|---|
| | BRT 1 | BRT 2 | BRT 3 | T1 | T6 | T9 | T4 | BRT 1/T4 | BRT 1 to T4 |
| Total | $4.21 | $3.62 | $3.90 | $10.71 | $11.17 | $10.93 | $11.26 | $5.98 | $12.01 |

In terms of benefiting riders, the cost effectiveness of each alternative is much improved, with the BRT Alternative generating the lowest annualized cost per rider.

#### 10.1.4.4 Summary

The relative performance of alternatives with respect to Goal 5 is summarized in Table 10.1-23. Where appropriate, the results for both the "Build vs. Baseline" and "Build vs. Build" analyses are identified.

**Table 10.1-23: Summary of Evaluation Results for Goal 5**

| Consistency with Funding and Financial Capacity | |
|---|---|
| Financial Capacity | ▪ Build vs. Baseline: Not applicable. |

| | |
|---|---|
| | ▪ Build vs. Build: All Build Alternatives can be implemented and operated within the funding assumed to be available upon implementation of the project. |
| **Minimize Project Operating Costs** | |
| O&M Costs | ▪ Build vs. Baseline: All Build Alternatives result in increased O&M costs as compared to the Baseline Alternative.<br>▪ Build vs. Build: BRT has the lowest operating costs of the Build Alternatives, with BRT 1 generating the lowest costs of the BRT alignments. For Metrorail and Phased Implementation, Sites 15 and 20 would result in higher O&M costs than Site 7 due to their lengthy yard leads. |
| O&M Costs per Passenger Mile | ▪ Build vs. Base: All Build Alternatives result in reduced operating costs per passenger miles as compared to the Baseline Alternative.<br>▪ Build vs. Build: All Build Alternatives generate similar O&M costs per passenger mile, with BRT resulting in marginally lower costs than the other alternatives. |
| **Optimize Cost Effectiveness** | |
| Capital Costs | ▪ Build vs. Baseline: Not applicable.<br>▪ Build vs. Build: Phased Implementation would have the highest capital costs of the Build Alternatives. T6 and T4 are the most expensive of the rail alignments and have similar costs. |
| Cost Per New Rider | ▪ Build vs. Baseline: Not applicable (measure reflects incremental cost over the Baseline Alternative).<br>▪ Build vs. Build: BRT (particularly BRT 2) provides for the best cost effectiveness, in terms of new riders. |
| Cost Per Benefiting Rider | ▪ Build vs. Baseline: Not applicable (measure reflects incremental cost over the Baseline Alternative).<br>▪ Build vs. Build: BRT (particularly BRT 2) provides for the best cost effectiveness, in terms of total corridor riders. |

### 10.1.5 GOAL 6: SERVE DIVERSE POPULATIONS

Goal 6 was developed to ensure that the Dulles Corridor Rapid Transit Project provides an equitable distribution of benefits and impacts. One aspect of this equity is the relative balance of benefits and impacts to all residents and businesses within the corridor. A second aspect is the effect that the project has on minority and low-income populations in the corridor. In accordance with federal regulations on environmental justice, alternatives were assessed to determine whether or not they had disproportionate impacts on such populations. The specific objectives for this goal are shown in Table 10.1-24.

**Table 10.1-24: Objectives for Goal 6**

| **Goal 6 – Serve Diverse Populations** |
|---|
| ▪ Balance benefits and impacts to all residents within the corridor.<br>▪ Improve accessibility to existing and planned employment centers from low-income and minority areas.<br>▪ Provide transportation improvements that comply with the Americans with Disabilities Act standards.<br>▪ Minimize and mitigate negative impacts to low-income and minority populations. |

#### 10.1.5.1 Equitable Distribution of Benefits and Impacts

The Baseline Alternative does not have impacts on corridor residents; however, it also does not afford residents the benefits of rapid transit in the Dulles Corridor.

In general, the Build Alternatives have an equitable distribution of benefits and impacts. Most impacts on residents are in the vicinity of the proposed stations; therefore, communities that experience negative effects also receive benefits associated with improved transit access. The main exception is along the eastern end of the

Dulles Connector Road. Here, a substantial number of communities would experience noise impacts from the Build Alternatives, but would not receive the benefits of access because no new station is included in this area.

Other elements that could potentially result in an imbalance between benefits and impacts are the proposed maintenance and storage facilities. For the BRT and BRT/Metrorail alternatives, one of the access road options for the maintenance and storage facility would displace two businesses. In this case, relocation opportunities for these businesses exist in the county, so no special relocation hardship would be associated with the displacements. Moreover, the BRT facility would add new employment to the area. Similarly, the Metrorail S&I Yard on Site 7 would use land that could otherwise be developed into office uses, but the yard would add a substantial number of new jobs to the area.

All Build Alternatives are designed to be consistent with the requirements of the Americans with Disabilities Act; therefore, elderly and disabled persons would be accorded the same access benefits as the general population.

#### 10.1.5.2 Environmental Justice

The Dulles Corridor includes a relatively low number of minority and low-income residents. Most of these residents live at the western end of the Mid-Corridor segment, near Dulles Airport. There is also a concentration of minority residents along the south side of the Dulles Connector Road near the Route 123 interchange at the eastern edge of Tysons Corner.

The Baseline Alternative would not have impacts on the low-income and minority populations in the corridor, but it would also deny these residents the benefits of rapid transit access.

The Build Alternatives generally provide improved access for low-income and minority residents in the corridor through stations at Route 28 and Herndon-Monroe. Because they do not include a station at Route 28, BRT 2 and BRT 3 would not provide the same level of access for minority and low-income populations as the other alternatives. The Metrorail, BRT/Metrorail, and Phased Implementation alternatives would provide better access than the BRT Alternative for minority residents in Tysons Corner because these alternatives include the Tysons East Station.

All Build Alternatives would provide improved accessibility between jobs in the corridor and low-income and minority populations throughout the region by providing a direct rapid transit connection to the regional Metrorail system.

Though some of the Build Alternatives would have negative effects on some minority and low-income populations, such as noise or visual effects, none of these impacts would be disproportionate.

#### 10.1.5.3 Summary

The relative performance of alternatives with respect to Goal 6 is summarized in Table 10.1-25. The results for both the "Build vs. Baseline" and "Build vs. Build" analyses are identified.

**Table 10.1-25: Summary of Evaluation Results for Goal 6**

| **Equitable Distribution of Benefits and Impacts** | |
|---|---|
| Balance of benefits and impacts to all residents | ▪ Build vs. Baseline: The Baseline Alternative would not have impacts on residents and businesses, but would also not provide benefits associated with rapid transit service.<br>▪ Build vs. Build: All Build Alternatives generally have a balance of benefits and |

| | |
|---|---|
| | impacts. |
| **Environmental Justice** | |
| Improve accessibility for low-income and minority populations | ▪ Build vs. Baseline: The Baseline Alternative would not provide the benefits associated with rapid transit service.<br>▪ Build vs. Build: Metrorail, BRT/Metrorail (with BRT 1), and Phased Implementation would provide improved access for all low-income and minority populations in the corridor. BRT 1, 2, and 3 would not provide the same level of benefits for minority residents in Tysons Corner. In addition, BRT 2 and 3 would not provide benefits for residents near Route 28. |
| Minimize disproportionate impacts on low-income and minority populations | ▪ Build vs. Baseline: The Baseline Alternative would not have negative impacts on low-income and minority populations.<br>▪ Build vs. Build: The Build Alternatives would not have any disproportionate impacts on low-income and minority populations. Impacts to all corridor residents would be minimized using appropriate mitigation measures. |

## 10.2 SIGNIFICANT TRADE-OFFS AND SUMMARY

The "Build vs. Baseline" comparisons presented in the summary tables for each goal demonstrate that in most cases, the Baseline Alternative would not meet the goal of providing improved transit service in the Dulles Corridor as well as the Build Alternatives. The Build Alternatives would offer a much better level of transit service than what is included under the Baseline Alternative, enhancing mobility for corridor residents and employees, especially during the midday. Moreover, the Baseline Alternative would be inconsistent with local and regional comprehensive plans, which specifically identify rapid transit improvements in the Dulles Corridor as a critical element in shaping development in the corridor and meeting regional goals.

Table 10.2-1 outlines the essential differences between the Build Alternatives. In cases where a particular alignment option is far superior or inferior to other alignment options or alternatives, this has been noted in the table.

**Table 10.2-1: Significant Trade-Offs between Build Alternatives and Alignments**

| Project Goals | Essential Differences Between Alternatives and Alignments |
|---|---|
| Goals 1 and 2<br>Improve Transportation Service<br>Increase Transit Ridership | ▪ For the O/D pairs evaluated, the Metrorail and Phased Implementation alternatives (especially Alignment T1) generally result in the shortest travel time. This is particularly true for trips with one end in Tysons Corner and reverse commute trips.<br>▪ For the O/D pairs selected for analysis, Metrorail (and the final stage of Phased Implementation) requires the fewest number of transfers among the Build Alternatives.<br>▪ The Metrorail and Phased Implementation alternatives (particularly T6/T9) have the highest ridership, highest number of new riders, and highest corridor transit mode share among the Build Alternatives.<br>▪ Metrorail and Phased Implementation provide a much greater increase in the corridor's passenger-moving capacity than BRT and BRT/Metrorail.<br>▪ BRT and Phased Implementation provide improved service through the full length of the corridor much sooner than Metrorail.<br>▪ Phased Implementation would ultimately provide the same mobility benefits as Metrorail.<br>▪ Phasing from BRT 1 or BRT 2 would result in a 15 to 18 month suspension of the Metrorail-like service benefits provided by these BRT alignments. During conversion, the service provided by BRT 1 and BRT 2 would be more akin to the service offered by BRT 3.<br>▪ In the event of an emergency or service disruption, Alignment T4 is not as operationally flexible as the other Metrorail alignments. |
| Goal 3<br>Support Future Development | ▪ BRT 2 and 3 are not consistent with comprehensive plans because they do not include a Route 28 station. BRT 3 is less consistent with local plans because it includes stops instead of stations at Wiehle Avenue and Herndon-Monroe. |

| Project Goals | Essential Differences Between Alternatives and Alignments |
|---|---|
| | ▪ BRT does not support comprehensive plans as well as rail alternatives in Tysons Corner.<br>▪ Metrorail and Phased Implementation would have higher growth potential in station areas along the corridor due to higher allowable densities at rail stations.<br>▪ Alignment T4 would have the greatest development potential, but would not necessarily improve accessibility.<br>▪ Alignment T9 Design Option would be more consistent with VDOT plans in Tysons Corner than Alignment T9.<br>▪ S&I Yard Site 20 would be most consistent with existing and future land use plans. |
| Goal 4<br>Support Environmental Quality | ▪ BRT is less likely to affect the natural environment because it makes use of existing transportation facilities.<br>▪ Metrorail and the later stages of Phased Implementation are more likely to have noise and visual impacts because they include aerial structures and penetrate the core of Tysons Corner. Alignment T4 has greater impacts on communities than the other rail alignments.<br>▪ Metrorail and Phased Implementation are likely to have more substantial impacts on traffic in the vicinity of stations with parking and Kiss & Ride facilities due to increased demand associated with rail.<br>▪ Phased Implementation would affect resources sooner and for a longer period than Metrorail, but would also provide benefits sooner.<br>▪ S&I Yard Sites 15 and 20 would have greater potential for effects on the natural environment than Site 7. Site 15 would have the most substantial impacts. |
| Goal 5<br>Provide Cost-Effective, Achievable Transportation Solutions | ▪ BRT is much less expensive than the other Build Alternatives. Phased Implementation would have the highest capital costs. BRT 2 and 3 are the least expensive options, and T6 and T4 are the most expensive.<br>▪ O&M costs for Metrorail and Phased Implementation would be much higher for S&I Yard Sites 15 and 20 than for Site 7.<br>▪ BRT is more cost effective than the other Build Alternatives, in terms of both new riders and benefiting riders. BRT 2 is the most cost-effective alternative.<br>▪ BRT has significantly less overall passenger capacity than Metrorail. |
| Goal 6<br>Serve Diverse Populations | ▪ The BRT Alternative does not provide the same level of access for minority populations in Tysons Corner as the other alternatives.<br>▪ BRT 2 and 3 do not provide the same level of access for minority populations in the vicinity of Route 28 as other alternatives. |

## 10.3 ISSUES TO BE RESOLVED

Once the LPA is selected and prior to circulating the Final EIS, every reasonable effort will be made to resolve interagency issues related to the proposed action. If significant issues remain unresolved, these issues, and the consultations and efforts made to resolve the issues, will be documented in the Final EIS.

During preparation of the Draft EIS, the following issues were identified that will require further interagency consultation or additional action:

- Coordination with local communities to address outstanding issues related to facility design, potential effects, and mitigation.
- Coordination with FAA as a cooperating agency to satisfy FAA's responsibilities under NEPA.
- Coordination with FAA and MWAA regarding revisions to the Airport Land Use and Airport Layout plans to reflect use of Dulles Airport property for project improvements. FAA approval would be required for the release of any property currently dedicated for airport purposes.
- Coordination among DRPT, WMATA, the Northern Virginia Transportation Commission, MWAA, Fairfax County, and Loudoun County regarding project financial planning and funding.

- Coordination with Fairfax County regarding modifications to its Comprehensive Plan if BRT 2 or BRT 3 is selected as, or is an element of, the LPA.
- Development of master agreements between the project owner and MWAA, Loudoun County, and TRIP II of the Dulles Greenway.

# Comments, Consultations, and Coordination 11

# 11 COMMENTS, CONSULTATIONS, AND COORDINATION

The project team conducted a comprehensive public involvement program and coordinated with local, state, and federal agencies throughout the environmental review process for the Dulles Corridor Rapid Transit Project. Input from the public and the coordinating agencies helped to define and inform the study process. This chapter documents the public and agency coordination activities and the comments that were received, and discusses how public and agency comments influenced the environmental review process.

## 11.1 PUBLIC INVOLVEMENT

A variety of methods were used to encourage citizens to participate in the project, such as public meetings, project displays at shopping centers and fairs, project documents at libraries and community centers, and print, radio, and electronic media. Public input shaped the issues and alternatives studied, and received ongoing consideration during the study process. Appendix J-1 contains a summary of public comments received to date, arranged by geographical area and subject area.

The public involvement program accompanies each step of the environmental study process, beginning with scoping and continuing throughout the duration of the project. The following discussion outlines the public involvement program through each step in the study process thus far.

### 11.1.1 SCOPING

Scoping, the first step in the environmental study process, is the process by which the range of alternatives and issues for study is identified. Public comments received during the scoping period, which started in July 2000 and ended in September 2000 (see Section 2.7 for more information) resulted in the identification of additional alternatives for analysis.

The scoping meetings provided the general public with an overview of the project and allowed the project team the opportunity to obtain public comments. The meetings were held on three dates (July 25, 26, and 27, 2000) in three different locations for convenience to the attendees. (See Appendix J-2 for additional information about all of the public meetings held to date, including the public scoping meetings.) Following a presentation, the moderator opened the floor to solicit comments from meeting attendees and encouraged participants to issue additional comments to a court reporter. (See Appendix J-3 for agendas and handouts related to the scoping meetings.) A total of 210 comment forms were received as a result of the scoping meetings. The comments were used to identify the alternatives that were considered in the next stage of the environmental study process—the analysis of alternatives (refer to Section 2.7 for more information about the analysis of alternatives).

More than 400 members of the public attended the scoping meetings. Notification methods for the scoping meetings are listed below. Appendix J-4 includes copies of scoping meeting announcements disseminated through TV, radio, and print communication outlets.

- Public Scoping Information Packets, including invitations to public scoping meetings, mailed to 4,725 invitees;
- Meeting announcements sent to local libraries, community centers, and transportation management associations;
- Cable television notices provided to three local cable networks;
- News releases distributed to more than 50 print and broadcast media outlets in the region;
- Newspaper advertisements placed in 13 local newspapers;
- Project INFO line was established and a recorded message broadcasted the dates, times, and locations of the public and agency meetings; and
- Notices on the DRPT and WMATA websites.

Comments from the scoping meeting are broadly summarized below; Appendix J-1 includes a more detailed summary of all public comments, including those made at the scoping meetings.

The scoping meeting held on July 25, 2000, was at George C. Marshall High School in Falls Church, Virginia. 203 members of the public attended, and 29 members of the public spoke. Comments at this meeting were generally related to:

- Support for mass transit in the corridor;
- Parking;
- Pedestrian access;
- Land use and development close to the proposed station locations;
- Station locations and alignment alternatives; and
- Impacts (e.g., noise levels, pollution, property values, congestion, and crime).

The scoping meeting held on July 26, 2000, was at Langston Hughes Middle School in Reston, Virginia. 149 members of the public attended, and 19 members of the public spoke. Comments at this meeting were generally related to:

- Support for the project and the extension of Metrorail service;
- Project schedule;
- Transit-friendly and mixed-use development;
- Increased density near proposed station locations;
- Impacts on the community (e.g., air quality);
- Pedestrian access and provisions for people with disabilities;
- Transferring between Metrorail and bus/Bus Rapid Transit (BRT) service;
- Increased frequency of service and extended hours of operations for service to Dulles Airport;
- An integrated transportation system in Northern Virginia (including feeder bus service); and
- Costs and/or funding.

The scoping meeting held on July 27, 2000 was at Ashburn Elementary School in Ashburn, Virginia. 61 members of the public attended, and 12 members of the public spoke. Comments at this meeting were generally related to:

- Support for the project;
- Project schedule and implementation;
- Alternatives under consideration;
- Transit that would serve commuters from western Fairfax County and Loudoun County;
- Land use planning and density near proposed station locations and parking facilities;
- Sprawl;
- Capacity of the Metrorail system;
- Cost and funding (including the impacts associated with the BRT national demonstration project);
- Purpose of an Environmental Impact Statement (as opposed to moving forward with an Environmental Assessment); and
- An integrated transit system in Northern Virginia.

The scoping process included agency consultation as well. Section 11.2.2 discusses the agency scoping meetings. The results of the scoping process were documented in the September 2000 *Scoping Process Report*.

### 11.1.2 INITIAL ALTERNATIVES ANALYSIS

The alternatives and issues identified during scoping provided the basis for the next step in the study process—the initial alternatives analysis. Between October 2000 and February 2001, the project team assessed the alternatives in order to make recommendations about which alternatives should be carried forward for further evaluation, and which should be eliminated from further study (see Section 2.7). During this process, public comments were collected and distributed among the project team and received ongoing consideration.

To facilitate public participation in the project, several methods for communication with the public were utilized; these methods are discussed below.

**Kiosk at Tysons Corner Center.** This project information site was opened in October 2000 to give members of the public expanded opportunity to learn about the project where they work or shop. Visitors have the opportunity to pick up or review a variety of materials, speak with project staff members, use the project website, or sign up for project mailings. Approximately 26,500 people have visited the kiosk to date. Comments received at the kiosk were recorded and helped to provide feedback related to the study process. The kiosk will remain in operation throughout the environmental review process.

The kiosk is located on the upper level of the Tysons Corner Center, a regional shopping mall, adjacent to Lord & Taylor. It is staffed during normal mall hours, Monday through Saturday from 10 a.m. to 9:30 p.m. and on Sunday from 11 a.m. to 6 p.m.

**Project Website (www.dullestransit.com).** The project website provided updated information about the project including a project overview, schedule, description of the preliminary engineering and NEPA

process, alternatives under consideration, public involvement opportunities, publications, maps, photographs, frequently asked questions, and other transit-related materials. The website also offered a link to contact the project team directly through the project e-mail address (dullescorridor@aol.com). The website will be maintained and updated throughout the environmental review process.

**Project E-mail Address (dullescorridor@aol.com).** Linked to the project website and included on all publicly distributed project materials, the project e-mail address offered a convenient way for the public to provide comments, ask questions, and request additional information on the project. The e-mail address was particularly useful for individuals with limited time to attend public meetings and those who were handicapped or had limited transportation options. To date, 425 e-mail messages have been received and answered via the e-mail address. The project team will continue to receive and answer email messages throughout the environmental review process.

**Project INFO Line (1-888-566-7245).** The project INFO line, a toll-free, 24-hour telephone number, was established to receive comments and disseminate information. Callers were encouraged to ask questions and provide comments about the project. For specific questions, callers could leave their telephone number and an appropriate staff member responded to their question. A telephone number was also established incorporating Telecommunications Device for the Deaf (TDD) technology for callers requiring such special assistance (202-638-3780). The project INFO line has received a total of 419 calls to date. The INFO line will be maintained throughout the environmental review process.

**Project Mailing List.** A project mailing list was compiled and continually updated with new contacts as they requested information. Groups and individuals on the list received newsletters, updates, meeting notices, and other project materials. To date, it comprises contact information for approximately 10,500 individuals, groups, and agencies. The list will continue to be maintained through the completion of the environmental review process.

**Newsletters.** Newsletters were produced at project milestones to update the public and to obtain public comment, the first corresponding with the start of the scoping process in July 2000. Newsletters typically were four pages with an additional comment sheet and postage-paid reply mailer. To date, four newsletters have been produced and mailed to the individuals and groups on the project mailing list. Newsletters are also available at the Tysons Corner Center project kiosk, the Reston information center (see Section 11.1.3 for more information), project corridor libraries and community centers, public hearings and meetings, and online at the project website. Since May 2001, newsletters have included a news item in Spanish to announce that additional Spanish language project information is available through the Project INFO line.

**Project Updates.** Project updates were published monthly between newsletters beginning in August 2000. These two-page publications discussed the latest project developments and future public participation opportunities and were mailed to all contacts on the project mailing list. They also were distributed at the Tysons Corner Center project kiosk, the Reston information center, project corridor libraries and community centers, at public hearings and meetings, and online at the project website. To date, nine updates have been produced. Project Updates will continue to be published through the completion of the environmental review process.

**Comment Forms.** Comment forms were made available in project newsletters, at public meetings, and at other project venues. These two-page questionnaires included questions about various project developments. The forms could be returned at drop-off boxes at meetings or hearings or placed in the mail (they included pre-

paid postage). A total of more than 500 comments sheets have been received to date. Comment forms will continue to be distributed and the comments obtained will continue to be considered throughout the completion of the environmental review process.

**Libraries and Community Center Outreach.** More than 20 libraries and community centers within the Dulles Corridor displayed project materials such as project newsletters, updates, and reports that could be examined during normal hours of operation. Appendix J-5 includes a list of locations. Project materials will continue to be available at libraries and community centers throughout the environmental review process.

**Stakeholder Meetings.** Stakeholder meetings were held during the period that the project team was conducting the initial analysis of alternatives to provide project information and to obtain stakeholder input. Stakeholders typically are individuals and groups that would be most affected by proposed transit improvements. For the project, stakeholders are the business owners, developers, landowners, and tenants in and near proposed station areas. Stakeholders were identified using real estate maps and information from agencies and organizations active in the Dulles Corridor. Stakeholder meetings were open to any individual or group wishing to attend.

Stakeholder meetings were held on December 12, 13, and 14, 2000. Each meeting focused on one of three geographic sections of the corridor: Tysons Corner area; the Wiehle Avenue, Reston Parkway, Herndon-Monroe, and Route 28 areas; and the Route 606 and Route 772 areas (which include the proposed BRT Maintenance and Storage Facility and Metrorail S&I Yard locations). A total of 159 stakeholders were invited to attend the meetings and approximately 60 attended. Appendix J-6 includes a list of the stakeholder meetings attendees and the issues and concerns that were raised for each station area.

**Public Information Meetings.** After the project team had completed the initial alternatives analysis, public information meetings were held to provide an update on the project and to obtain public input. Notification methods for these meetings were the same as for the scoping meetings described in Section 11.1.2. Appendix J-7 includes several of the public information meeting announcements.

The meetings included formal a presentation by DRPT and WMATA project managers followed by an open house, which provided opportunity for the project team members to talk with the public one-on-one. The project team members later recorded and circulated the comments they received during conversations with the public. A total of 20 comment forms were also received from individuals attending the meetings. Appendix J-1 includes a summary of all public comments, including those made at the public information meetings. Appendix J-8 includes handouts related to the public information meetings.

The public information meeting held on January 30, 2001 was at George C. Marshall High School in Falls Church, Virginia. 143 members of the public attended. Comments at this meeting were generally related to:

- Pedestrian access and overpasses;
- Coordination with other transit studies;
- Service to Tysons Corner Center;
- Support for and opposition to aerial alignments;
- Cost and funding;

- Operational flexibility; and
- Enhanced bus service.

The public information meeting held on January 31, 2001 was at Langston Hughes Middle School in Reston, Virginia. 104 members of the public attended. Comments at this meeting were generally related to:

- Smart growth;
- Land use planning and mixed-use development;
- Pedestrian and bicycle access to station locations;
- Location of the Wiehle Avenue and Reston Parkway stations; and
- Parking.

The public information meeting held on February 1, 2001 was at Ashburn Elementary School in Ashburn Virginia. 51 members of the public attended. Comments at this meeting were generally related to:

- The BRT Maintenance and Storage Facility and Metrorail S&I Yard;
- Bus and pedestrian access;
- Land use planning and mixed-use development; and
- Parking.

In addition, the public offered general comments regarding the scoping process, evaluation criteria, and other aspects of the project at the public information meetings. The additional comments included:

- Impacts on the Metrorail Orange Line;
- Impact of the proposed widening of I-66 in Arlington;
- Opposition to BRT service;
- Light rail transit;
- Project schedule;
- Support for the results of the scoping process;
- Parking;
- Induced development from existing employment centers;
- Impacts of connecting to the East Falls Church or West Falls Church Metrorail Station;
- Noise, vibration, and visual impacts;
- Service design (prior to designing the tracks);
- Location of the Wolf Trap Farm Park Station and its designation as a special use station;
- Feeder bus service;
- Coordination with other transit studies and connectivity between the lines;
- High density development;

- Opposition to the Hunter Mill Road Station; and
- Locations of the BRT Maintenance and Storage Facility and the Metrorail S&I Yard.

### 11.1.3 INTERMEDIATE ALTERNATIVES ANALYSIS

Following initial alternatives analysis, the project team conducted additional analyses to determine the alternatives that would be evaluated in the Draft EIS (see Section 2.7 for more information about the alternatives analysis process). At the end of the intermediate screening process, a newsletter was published to update the public and to solicit public input. In addition, the *Final Alternatives Analysis Report* was published in May 2001 to provide detailed documentation of the entire alternatives analysis process and to document the alternatives that would be carried forward for full evaluation in the Draft EIS. Public comments continued to be collected, circulated, and considered during the intermediate alternatives analysis. In addition to the ongoing activities outlined in Section 11.1.2, the following additional activities occurred during the intermediate analysis of alternatives.

**Media Outreach.** On April 3, 2001, an additional press release was distributed to inform the public about the status of the Dulles Corridor Rapid Transit study. It was distributed in Spanish as well as English: "Dulles Corridor Rapid Transit is Under Study/El Area Del Aeropuerto de Dulles Esta Bajo Estudio." Appendix J-9 includes a list of media outlets used throughout the study process and copies of press releases in Spanish and English.

**Project Information Center at the Spectrum at Reston Town Center.** The project information center was established in May 2001 to give members of the public expanded opportunities to learn about the project where they work or shop. At the center, visitors could pick up a variety of materials, speak with project staff members, use the project website, and sign up for project mailings. Comments received at the project information centers were recorded and helped to inform the study process. To date, 70 members of the public have visited the center. The center will remain open throughout the environmental review process.

The project information center is located at 11846C Spectrum Center Drive, below Men's Wearhouse and next to the Doubletake Salon. The center is open on Thursdays, 11:30 a.m.-7 p.m. and Saturdays 11:30 a.m.- 5 p.m. After June 18, it will be open 9 a.m.-5 p.m., Monday through Saturday. Appendix J-10 includes a project information center announcement that was distributed to retailers in the Spectrum Center for display in their shops. The announcement was also available to visitors at the project kiosk.

### 11.1.4 CIRCULATION OF THE DRAFT EIS

Community outreach during the Draft EIS public comment period will be conducted in accordance with NEPA requirements. After the publication of the Notice of Public Availability in the *Federal Register,* copies of the EIS will be made available at the libraries and community centers listed in Appendix J-5. Formal public hearings for public and agency feedback will be held following publication of this Draft EIS. Notification of the public will be conducted through the methods below:

- Meeting announcements sent to local libraries, community centers, and transportation management associations;
- Meeting announcements available at project kiosk and information center;
- Cable televisions notices;

- News releases distributed print and broadcast media outlets in the region;
- Newspaper advertisements placed in local newspapers;
- Notice on the Project INFO line;
- Notices on the DRPT and WMATA websites; and
- Notice on project website.

### 11.1.5 ADDITIONAL MEETINGS AND PRESENTATIONS

Additional public presentations and meetings, which helped to increase outreach and encourage public participation, were held throughout the environmental study process. These additional activities are discussed below.

**Representation at Community Fairs and Festivals.** The public had opportunity to learn about and comment on the project and sign up for the project mailing list at special community events. The project team displayed project information at the following festivals and fairs:

- Fall for Fairfax Festival at the Fairfax County Government Center on October 7, 2000;
- Reston Community Connections event at the Reston Town Center on October 12, 2000;
- Fall Family Fun Fest in McLean on October 14, 2000;
- McLean Day at Lewinsville Park on May 19, 2001; and
- Celebrate Fairfax 2001 at the Fairfax County Government Center on June 8-10, 2001.
- Fall for Fairfax, September 29, 2001.

**Community Presentations.** Project team members have conducted 55 meetings to date with communities, associations, and other organized groups. The presentations, given to groups on request, informed the groups about the project and provided a forum for questions and comments. Meetings were held as follows:

- April 14, 2000 Dulles Area Transportation Association
- May 13, 2000 Hunter Mill Transportation Seminar
- May 18, 2000 Fairfax Committee of 100
- May 24, 2000 Tysons Transportation Association (TYTRAN)
- July 14, 2000 Dulles Corridor Rail Association (Board)
- August 15, 2000 Women's Transportation Seminar
- August 29, 2000 Sully District Council Committee
- September 14, 2000 Greater Washington Board of Trade
- September 15, 2000 Institute of Transportation Engineers
- September 22, 2000 Route 28 Corridor Transportation Seminar
- October 17, 2000 Dulles Corridor Rail Association (Board)
- October 18, 2000 TYTRAN
- November 7, 2000 Pimmit Hills Citizens Association
- November 14, 2000 Cinnamon Creek Homes Association
- November 16, 2000 EAC of the Northern Virginia Employment Commission

| | |
|---|---|
| ▪ November 17, 2000 | Greater Reston Chamber of Commerce |
| ▪ November 28, 2000 | Dulles Corridor Rail Association |
| ▪ November 30, 2000 | TCC Citizens Advisory Committee |
| ▪ December 15, 2000 | Route 28 Corridor Transportation Seminar |
| ▪ January 3, 2001 | Chesapeake Railway Association |
| ▪ January 8, 2001 | Tysons Corner Center |
| ▪ January 9, 2001 | IEEE/ASME |
| ▪ January 18, 2001 | Dulles Area Transportation Association |
| ▪ January 24, 2001 | Dulles Corridor Rail Association |
| ▪ February 12, 2001 | Dulles Corridor Rail Association |
| ▪ February 21, 2001 | TYTRAN |
| ▪ February 21, 2001 | American Society of Highway Engineers |
| ▪ March 3, 2001 | Virginia Association of Railway Patrons |
| ▪ March 17, 2001 | National Association of Railroad Passengers |
| ▪ March 22, 2001 | Reston Association |
| ▪ March 26, 2001 | Arlington Rotary Club |
| ▪ March 27, 2001 | American Planning Association Virginia Conference |
| ▪ March 31, 2001 | Reston Town Meeting |
| ▪ April 17, 2001 | Washington Area Railway Engineers |
| ▪ April 19, 2001 | Northern Virginia Technology Council – Transportation Committee |
| ▪ April 20, 2001 | State and Local Policy Committee (Fairfax County Chamber) |
| ▪ April 24, 2001 | The Rotonda Board |
| ▪ May 2, 2001 | Northern Virginia Transportation Alliance Board |
| ▪ May 3, 2001 | Reston Association |
| ▪ May 15, 2001 | Weichert Realtors |
| ▪ May 17, 2001 | Hallcrest Heights Community Association |
| ▪ May 17, 2001 | TYTRAN |
| ▪ May 17, 2001 | Transportation Coordinating Council of Northern Virginia |
| ▪ May 18, 2001 | Route 28 Corridor Transportation Seminar |
| ▪ June 11, 2001 | Claude Moore Charitable Foundation |
| ▪ June 17, 2001 | TYTRAN |
| ▪ June 18, 2001 | McGuire Woods |
| ▪ June 22, 2001 | Dulles Corridor Rail Association |
| ▪ July 19, 2001 | Consulting Engineers Council of Metropolitan Washington |
| ▪ July 24, 2001 | TYTRAN |
| ▪ September 17, 2001 | Fairfax County Economic Development Authority |
| ▪ September 26, 2001 | Dulles Corridor Rail Association |
| ▪ September 29, 2001 | Transit-Oriented Development Workshop Hosted by Hunter Mill District, Fairfax County Board of Supervisors |
| ▪ November 30, 2001 | Dulles Corridor Rail Association |

- December 13, 2001 Reston Association

**Meetings with Businesses.** The project team has had 29 meetings with businesses in the corridor. The meetings were held at the request of the businesses and provided opportunity for discussion of the project and for comment from the business community. The meetings are summarized below:

- March 15, 2000 West*Group
- March 23, 2000 TRIP II
- October 4, 2000 Capitol One
- December 11, 2000 Reston Town Center Development
- January 8, 2001 Tysons Corner Center
- January 17, 2001 National Air and Space Museum Dulles Center
- January 24, 2001 Capital One
- February 12, 2001 Reston Sheraton Development
- February 12, 2001 Tysons Corner Best Western
- February 13, 2001 Toll Brothers
- February 20, 2001 National Air and Space Museum– Dulles Center
- February 21, 2001 Tysons Corner Center Consultant
- February 21, 2001 Moore Cadillac
- February 22, 2001 Charles E. Smith, Inc.
- February 23, 2001 DynCorp
- March 1, 2001 Capital One
- March 1, 2001 Crimson Properties/RTKL
- March 2, 2001 West*Group
- March 2, 2001 Reston Sheraton Development
- March 7, 2001 Antigone Realty
- March 10, 2001 Center for Innovative Technology
- March 15, 2001 Capital One
- March 26, 2001 Lerner Enterprises
- May 8, 2001 TRIP II
- October 9, 2001 Lerner Enterprises
- December 5, 2001 Crimson Partners and Walsh Colucci Stackhouse Emrich & Lubeley
- December 14, 2001 Comstock
- December 18, 2001 TRIP II
- January 18, 2002 TRIP II

## 11.2 AGENCY COORDINATION

This section summarizes coordination with local, state, and federal agencies during the environmental review process for the project. Coordination activities began with publication of a Notice of Intent to Prepare an EIS in the *Federal Register* on June 26, 2000. This notice was also published in the legal section of the *Washington Post*.

FTA is the lead agency for the project; DRPT is the project sponsor, and WMATA is the technical manager, and; FAA is a cooperating agency (a cooperating agency typically has direct interest in the project). In addition, there are more than 70 coordinating agencies, which are listed in Appendix K-1. Agency coordination activities included early agency interviews, scoping meetings, letters to agencies requesting data, coordination meetings throughout the process, and agency meetings during the analysis of alternatives. The comments obtained from agencies throughout the process are summarized in Appendix K-2.

### 11.2.1 AGENCY INTERVIEWS

The project team initiated interviews with agencies in April 2000 to present the schedule for the preliminary engineering and environmental phase of the project, to review the initial scope of work, and to describe the known alternatives and their locations. The project team conducted agency interviews with Fairfax County, Loudoun County, Virginia Department of Transportation (VDOT), and the Metropolitan Washington Airports Authority (MWAA) as follows:

- April 11, 2000 Fairfax County
- April 21, 2000 Metropolitan Washington Airports Authority (MWAA)
- May 25, 2000 Virginia Department of Transportation (VDOT)
- June 16, 2000 Loudoun County
- August 14, 2000 Metropolitan Washington Airports Authority (MWAA)

A broad summary of the comments received at the agency interviews are below. Refer to Appendix K-2 for a full summary of agency comments, which includes those from agency interviews. Issues discussed at the meetings included:

- Configuration of the Dulles Airport Station, including accommodation of a future people-mover, and methods to minimize disruption to ground transportation facilities and operations during construction;
- Coordination with the State Historic Preservation Officer through with regard to the historic resources of the Dulles Airport terminal;
- Appropriate agency contacts for project coordination;
- The region's long-range plan and Fairfax County's Comprehensive Plan;
- Designing the pedestrian bridges of the project's stations to be freely accessible by the general public rather than solely by BRT or Metrorail patrons;
- Improvements planned for the Dulles Toll Road and Access Road;
- Impacts on parking, bus, and Kiss & Ride facilities at East Falls Church Station;
- Extension of BRT service to East Falls Church;
- Evaluation of land use impacts;
- Pedestrian/bikeway bridge to provide access to the Falls Church Station from the south side of I-66;
- Orange Line Capacity;

- Fairfax County's procedural requirements for amending the Comprehensive Plan for special exemptions and for planning approvals;
- A loop alignment with two tracks in lieu of the single track along Routes 123 and 7;
- Locating Wolf Trap Farm Park Station as part of the decision-making process during the preparation of the Draft EIS;
- Pedestrian access between all four quadrants of the Reston Parkway interchange and the Reston Town Center Station;
- Planned developments and highway construction in station areas;
- The MIS evaluation of BRT Maintenance and Storage Facility and Metrorail S&I Yard sites; and
- Current shuttle bus operations in the corridor.

### 11.2.2 AGENCY SCOPING

Agency pre-scoping and scoping meetings were held as detailed below. Appendix K-2 presents a summary of all agency comments made to date, including those at the various agency scoping meetings.

#### 11.2.2.1 Pre-Scoping

Pre-scoping packets were sent to 54 federal, state, and local agencies in June 2000 and included a project schedule, preliminary scope of work, the FTA Notice of Intent, and an invitation list for the pre-scoping meeting.

The pre-scoping meeting was held on July 11, 2000 and was attended by representatives from the 15 agencies listed in Table 11.2-1. Characteristics of the BRT and Metrorail alternatives to be analyzed in the EIS, including line, stations/stops, and ancillary facilities in each segment of the corridor were presented at the meeting. Attendees were encouraged to attend the formal agency scoping meeting on July 27, 2000.

Discussion among the attendees raised the following issues:

- Locations of wide spots within the DAAR ("bubbles") to accommodate the proposed stations;
- Design issues at Dulles Airport, including the integration of a separate planned people-mover project, subway station width and depth, and BRT stops not interfering with existing ground activity, wetlands and floodplains on the property, and the impacts of cut-and-cover versus tunneling;
- Making the Federal Aviation Administration (FAA) a cooperating agency;
- Location of the BRT Maintenance and Storage Facility and Metrorail S&I Yard;
- Impacts of various alternatives on the local highway and roadway systems, including increased traffic on local roadways, which will require roadway improvements;
- Tysons Corner loop alignment;
- Protection of right-of-way for future use;
- Locations of park-and-ride lots and pavilion entrances;
- Elevated structures versus tunnels;

- Trails and pedestrian access;
- Public involvement;
- Visual impacts; and
- Impacts to Scotts Run Park.

#### 11.2.2.2 Scoping

A formal agency scoping meeting was convened at the Center for Innovative Technology in Herndon on July 27, 2000. Representatives from 10 agencies attended as listed in Table 11.2-1. The project components and some of the comments received during the public scoping meetings held on the previous two evenings were reviewed. In addition, a report summarizing the concerns raised at the pre-scoping meeting was made available to all attendees.

**Table 11.2-1: Agency Attendance at Pre-Scoping and Scoping Meetings**

| **Agency Pre-Scoping Meeting**<br>**July 11, 2000** | **Agency Scoping Meeting**<br>**July 27, 2000** |
|---|---|
| <u>Federal</u><br>Federal Aviation Administration (FAA)<br><u>Regional</u><br>Metropolitan Washington Airports Authority (MWAA)<br><u>State</u><br>Virginia Department of Conservation and Recreation<br>Virginia Department of Environmental Quality (VDEQ)<br>Virginia Department of Transportation (VDOT)<br><u>Local</u><br>City of Falls Church<br>Fairfax County Department of Planning and Zoning<br>Fairfax County Department of Transportation<br>Fairfax County Park Authority<br>Fairfax County<br>Loudoun County<br>Northern Virginia Regional Park Authority<br>Northern Virginia Transportation Commission (NVTC)<br>Town of Herndon<br>Town of Vienna | <u>Regional</u><br>Metropolitan Washington Airports Authority (MWAA)<br>Metropolitan Washington Council of Governments (MWCOG)—Transportation Planning Board (TPB)<br><u>State</u><br>Virginia Department of Transportation (VDOT)<br>Virginia Department of Forestry<br><u>Local</u><br>City of Falls Church<br>Fairfax County Department of Planning and Zoning<br>Fairfax County Department of Transportation<br>Loudoun County Building and Development<br>Northern Virginia Transportation Commission (NVTC)<br>Town of Herndon |

Discussion among the attendees raised the following issues:

- Including time for County Board of Supervisors' endorsement of project in the schedule;
- Evaluation of the travel time impacts of the various alignments;
- Additional alternatives and stations for evaluation;
- Travel demand modeling methods;
- Pedestrian access to stations; and
- Options for a light rail circulator in Tysons Corner.

Appendix K-2 includes a more detailed summary of all agency comments, including those made at the agency scoping meeting.

### 11.2.2.3 Supplemental Rail Yard Study Scoping

In November 2001, the Steering Committee for the Dulles Airport Rapid Transit Project asked DRPT and WMATA to consider alternative Metrorail S&I Yard sites to Site 7. In response, the project team initiated a Supplemental Rail Yard Study to examine different end-of-line locations for an S&I Yard. Pre-Scoping and Scoping meetings were held to solicit input on the initial list of yard sites to be considered.

**Pre-Scoping Meetings.** Pre-Scoping meetings were held on December 7 and 17, 2001, with MWAA, VDOT, and Loudoun County; and FAA and MWAA, respectively.

Discussion among the attendees raised the following issues:

- A request to eliminate the current S&I Yard Site 7 because of potential economic development plans on the site;
- The fact that the lease under which MWAA operates Dulles Airport requires 100 percent aeronautical use by the lease covenant; and
- Regulations on the use of land purchased with FAA grants.

**Scoping Meetings.** A Scoping Meeting was convened at the Dulles Hyatt on January 22, 2002. Representatives from 15 agencies attended as listed in Table 11.2-2. A brief project overview and a status report were presented, and input from agency representatives was solicited.

**Table 11.2-2: Agency Attendance at Supplemental Rail Yard Study Pre-Scoping and Scoping Meetings**

| Agency Pre-Scoping Meeting<br>December 7 and 17, 2001 (combined attendance) | Agency Scoping Meeting<br>January 22, 2001 |
|---|---|
| <u>Federal</u><br>Federal Aviation Administration (FAA)<br><u>Regional</u><br>Metropolitan Washington Airports Authority (MWAA)<br><u>State</u><br>Virginia Department of Transportation (VDOT)<br><u>Local</u><br>Loudoun County | <u>Federal</u><br>Federal Aviation Administration (FAA)<br>Federal Highway Administration (FHWA)<br>National Oceanic and Atmospheric Administration (NOAA)<br>National Weather Service<br>U.S. Army Corps of Engineers (USACE)<br><u>Regional</u><br>Metropolitan Washington Airports Authority (MWAA)<br><u>State</u><br>Virginia Department of Agriculture & Consumer Services<br>Virginia Department of Business Assistance<br>Virginia Department of Conservation and Recreation<br>Virginia Department of Environmental Quality<br>Virginia Department of Transportation (VDOT)<br><u>Local</u><br>Fairfax County Department of Transportation<br>Loudoun County Department of Economic Development<br>Loudoun County Office of Transportation Services<br>Town of Herndon |

Discussion among the attendees raised the following issues:

- With regard to the evaluation of Site 16, which is located on NOAA property, about one-third of the site is being transferred to MWAA, for use as a balloon launch and a weather station, with need for clear space for these purposes;
- A county planned road (Route 717) would potentially be impacted by Yard 7;
- The MWAA Dulles Airport land use plan should be used as a point of reference in the screening of the supplemental yards;
- FAA has possible concerns with releasing any Dulles Airport property;
- Development in the runway protection zone is not recommended;
- For Site 18, the shop facility and tower should be placed outside of the runway protection zone; and
- Structures for replacement parking, which would be required for Sites 18 and 19, might not be allowed in certain parts of the airport, unless the structures were at least partially underground.

Appendix K-2 includes a more detailed summary of all agency comments, including those made at the agency pre-scoping and scoping meetings for the Supplemental Rail Yard Study.

### 11.2.3 WORKING GROUP AND STEERING COMMITTEE

Working groups were convened with appropriate agency representatives to facilitate technical, operations, and financial planning for the project. In addition, executives from the project's funding partners participated in the Dulles Corridor Steering Committee, which provided oversight and policy direction for several project issues, particularly financial issues. The working groups and steering committee are discussed below.

**Technical Working Group.** Agency representatives with technical expertise participated in the project as a Technical Working Group. Jurisdictions and agencies represented in the Technical Working Groups include VDOT, MWAA, Fairfax County, Loudoun County, Arlington County, Town of Herndon, and TRIP II (the owner of the Dulles Greenway).

Six Technical Working Group meetings were held during October and November 2000 to discuss alternatives for routes, stations, and Metrorail S&I Yard locations. The October and November 2000 Technical Working Group meetings were organized by geographic location as follows:

- **Group T** Tysons Corner area
- **Group D** Mid-Corridor (DAAR/Dulles Toll Road area including proposed stations at Wiehle Avenue, Reston Parkway, Herndon-Monroe, and Route 28)
- **Group L** Loudoun County (includes proposed stations at Route 606 and Route 772, and possible sites for the BRT Maintenance and Storage Facility and Metrorail S&I Yard)

A Project Status Briefing was held on April 23, 2001 to present the results of initial and intermediate screening process and solicit comments from the Technical Working Group. Representatives from five agencies attended: Arlington County, Fairfax County Department of Planning and Zoning, Fairfax County Department of Transportation, Loudoun County, and VDOT. In addition, a Technical Working Group Station Site Plan Review meeting was held on July 20, 2001, and Technical Working Group meetings were held to review the

status of the Draft EIS on December 11, 2001 and February 6, 2002. Appendix K-2 includes a summary of agency comments, including those from the Technical Working Group meetings.

**Operations Planning Working Group.** Representatives from Fairfax County, Loudoun County, and the MWAA participated in the project as an Operations Planning Working Group. The Operations Planning Working Group met monthly between December 2000 and June 2001 to discuss issues related to the operations of the proposed transit improvements in the Dulles Corridor, including model inputs and assumptions, headways, fares, service variables, route patterns, and facilities. The group established the service assumptions for generating travel demand model forecasts for the project.

**Financial Working Group.** Representatives from Fairfax County, Loudoun County, and MWAA also participated in the project as a Financial Working Group. The group was established to discuss project funding sources, availability, timing, allocation, and possible creation of transportation improvement tax districts. Coordination with representatives in the Financial Working Group resulted in informal agreement on the allocation of capital costs among the jurisdictions. The group coordination efforts also facilitated discussion of the distribution of operations and maintenance costs and subsidy allocation as well as discussion of the federal funding process.

Informal coordination among members of the Financial Working Group is ongoing. Group meetings were held at the Fairfax County Government Building on the following dates:

- November 7, 2000
- December 7, 2000
- January 16, 2001
- February 13, 2001
- February 26, 2001
- March 13, 2001
- April 17, 2001
- May 15, 2001
- March 21, 2002

**Dulles Corridor Steering Committee.** The Dulles Corridor Task Force was established in 1998 to help the Virginia Secretary of Transportation develop transit solutions for the Dulles Corridor. This group was instrumental in advancing the project into the environmental study phase of the project. During the preliminary engineering and environmental review study phase, a new group called the Dulles Corridor Steering Committee was established to provide oversight and policy direction on issues related to the project's financing, construction, and operation. A subset of the original Dulles Corridor Task Force membership, the Steering Committee is composed of the executives from each of the project's funding partners:

- DRPT Director
- WMATA Chief Executive Officer
- MWAA General Manager

- Northern Virginia District Representative of the Commonwealth Transportation Board (CTB) (Steering Committee Chairman)
- Northern Virginia Transportation Commission Member (Observer)
- Fairfax County Executive
- Loudoun County Administrator
- Herndon Town Manager

The Steering Committee met as needed throughout the development of the Draft EIS to discuss policy, financial planning, and management issues. As a part of this effort, the Steering Committee has identified several options for providing the non-federal share of capital funding, built on the work of the Financial Working Group to determine an equitable allocation of capital and operating costs among the funding partners, and developed a recommended implementation schedule for the project. Steering Committee Meetings were held on the following dates:

- April 27, 2000
- July 13, 2000
- January 3, 2001
- February 6, 2001
- March 6, 2001
- April 3, 2001
- May 8, 2001
- July 17, 2001
- October 23, 2001
- November 27, 2001
- January 29, 2002
- April 5, 2002

### 11.2.4 AGENCY DATA REQUESTS

In January 2001, the project team corresponded with several agencies to ask for data about natural and cultural resources in the Dulles Corridor, which were used to evaluate the environmental impacts of proposed alternatives (as documented in the Technical Reports and the Draft EIS). Appendix F includes copies of all the letters received from agencies, including responses to data requests. The following agencies were sent requests for data:

- Virginia Department of Agriculture and Consumer Services;
- Virginia Department of Conservation and Recreation;
- Virginia Department of Environmental Quality;
- Virginia Department of Game and Inland Fisheries;
- Virginia Department of Historic Resources; and

- United States Fish and Wildlife Service.

### 11.2.5 JURISDICTIONAL DETERMINATION REQUEST

Section 404 of the Clean Water Act requires that permits from the U.S. Army Corp of Engineers (USACE) be obtained for projects that could cause impacts to waters of the U.S. The first step in the permitting process is to survey and delineate the water resources within the project area, and to request that the USACE review the survey to determine whether the agency is in agreement with the delineation. This process is referred to as a Jurisdictional Determination. The USACE provided the Jurisdictional Determination on March 22, 2002. The Jurisdictional Determination is valid for a period of five years, unless new information warrants revision. A copy of USACE correspondence providing the Jurisdictional Determination is included in Appendix F.

If the locally preferred alternative (LPA), which will be selected after the publication of this document, were anticipated to impact any of the water resources identified by the Jurisdictional Determination, the project team would apply to the USACE for the required permits. This phase of the permitting process would be documented in the Final EIS.

### 11.2.6 AREA OF POTENTIAL EFFECTS

The Area of Potential Effects (APE) is the geographic area within which an undertaking could cause alterations in the character or use of historic properties, if any such properties are present. It guides the analysis of potential impacts to historic resources by delineating the area of evaluation. The National Historic Preservation Act (NHPA) requires that the APE be determined for proposed federal actions in consultation with the State Historic Preservation Officer (SHPO).

WMATA and MWAA met with representatives of the SHPO at the Virginia Department of Historic Resources (VDHR) in Richmond on February 28, 2001. The proposed transit improvements were presented. The previously identified cultural resources within one mile of the project area were summarized and were illustrated on topographic maps. The project team recommended that the APE for archaeology would include the project Limits of Disturbance (LOD) plus a 200-foot buffer zone, since this would encompass the area where ground disturbance may be expected to occur. The recommended APE for architectural resources included the APE for archaeology plus areas where the undertaking might have a visual effect on any resources eligible for the National Register. The SHPO representatives had no objections to this determination of the APE. Figures showing the APE are in Section 3.5.

The SHPO recommended the development of a Programmatic Agreement (PA) to be signed by the SHPO and FTA, with the concurrence of DRPT, WMATA, and MWAA. The PA documents the measures that will be taken to ensure that the project is in accordance with federal regulations pertaining to historic properties. The PA will be submitted to the signatories for review and comment; modified as needed; and signed. A copy of the draft PA is in Appendix H.

### 11.2.7 AGENCY COORDINATION MEETINGS

In May 2001, representatives from 72 agencies were invited to attend Agency Coordination Meetings. For convenience to the attendees, meetings were held on two dates (June 11 and 13, 2001) and in two locations (Herndon and Richmond). The meetings provided updated project information and information regarding data

collection efforts and impact assessment methodologies. The meetings were followed by question and answer sessions. Table 11.2-3 lists the agencies that attended each meeting.

**Table 11.2-3: Agency Coordination Meetings**

| **Agency Coordination Meeting June 11, 2001** | **Agency Coordination Meeting June 13, 2001** |
|---|---|
| Federal | Federal |
| FTA | Federal Highway Administration (FHWA) |
| National Park Service | State |
| United Sates Environmental Protection Agency (EPA) | Virginia Department of Environmental Quality |
| USACE | Virginia Marine Resources Commission |
| Regional | Virginia Department of Conservation and Recreation |
| MWCOG | VDOT |
| MWAA | Virginia Department of General Services |
| State | Virginia Department of Agriculture and Consumer Services |
| VDOT | Virginia Department of Labor and Industry |
| Virginia Department of Emergency Management | |
| Local | |
| Arlington County Department of Public Works | |
| City of Falls Church | |
| Fairfax County Department of Planning & Zoning | |
| Fairfax County Department of Transportation | |
| Fairfax County Economic Development Authority | |
| Fairfax County Water Authority | |
| Loudoun County Administrator | |
| Loudoun County Office of Transportation Services | |
| Northern Virginia Regional Park Authority | |
| Town of Herndon | |

The issues of discussion raised by agency representatives at the Agency Coordination Meetings are summarized below. See Appendix K-2 for a full summary of agency comments, including those from the Agency Coordination Meetings.

- Consideration of the additional impervious surface of the third lane of the DAAR in stormwater management and drainage plans;
- Identification of parks, trail paths, proposed parks, and greenways in the project area;
- Assessment of the value of station area development;
- Utilization of BRT facilities after Metrorail is in place;
- Landscaping stormwater facilities to use as community facilities;
- Potential presence of rare mussels in streams in project area;
- Diabase Glades located near project area, which support rare plants;
- Wetlands near station areas;
- Funding issues;
- Noise barrier construction;

- Traffic impacts;
- Operation plan assumptions for feeder bus headways;
- The location and historic status of the Sunset Hills Railroad Station along the W&OD Trail; and
- Long-range plans for extending the project to Leesburg.

### 11.2.8 CIRCULATION OF DRAFT TECHNICAL REPORTS

Technical Reports were prepared in support of the Draft EIS, and include environmental, transportation, social and economic data of a more technical and detailed nature. Draft copies of the Technical Reports were distributed to local agencies in February 2002 to inform the agencies of technical data related to the project and to seek comments.

### 11.2.9 CIRCULATION OF THE DRAFT EIS

After the publication of the Notice of Public Availability in the *Federal Register,* copies of the Draft EIS will be sent to representatives of the agencies identified in Appendix B. Agency representatives will be mailed notice of the formal public hearings for agency and public feedback that will be held following the publication of this Draft EIS. Written agency comments will also be accepted during the circulation period.

### 11.2.10 OTHER AGENCY MEETINGS

Throughout the preliminary engineering and environmental review process, additional meetings were convened with many of the coordinating agencies. A complete list of coordinating agencies is included in Appendix K-1.

More than 85 additional agency coordination meetings have been conducted to date. The dates of these additional meetings and the agencies that attended are listed in Table 11.2-4.

**Table 11.2-4: Summary Of Other Agency Coordination Activities**

| Date of Meetings | Agencies Attending |
|---|---|
| June 5, 2000 | Fairfax County and VDOT |
| July 10, 2000 | Loudoun County Transportation Committee |
| July 17, 2000 | City of Falls Church Council |
| July 21, 2000 | MWAA |
| August 2, 2000 | Fairfax County Dulles Corridor Land Use Task Force |
| August 2, 2000 | Fairfax County and Developer |
| August 7, 2000 | Fairfax County Transportation Committee |
| August 15, 2000 | DRPT and Capital Beltway Rail Feasibility Study Consultant |
| August 23, 2000 | Town of Herndon |
| August 29, 2000 | Arlington County |
| August 30, 2000 | National Park Service and Wolf Trap Foundation |
| September 6, 2000 | Town of Herndon and Consultant |
| September 12, 2000 | MWAA |
| September 19, 2000 | Loudoun County |
| September 23, 2000 | Fairfax County Planning Commission |

| Date of Meetings | Agencies Attending |
|---|---|
| October 2, 2000 | Loudoun County Transportation Committee |
| October 10, 2000 | MWAA |
| October 11, 2000 | VDOT Capital Beltway Study Team |
| October 12, 2000 | Town of Herndon and Consultant |
| October 20, 2000 | FHWA and VDOT |
| October 23, 2000 | Capital Beltway Rail Feasibility Study Consultant |
| October 27, 2000 | Fairfax County and Consultant |
| November 1, 2000 | VDOT Capital Beltway Study Team |
| November 2, 2000 | MWAA |
| November 7, 2000 | MWAA |
| December 4, 2000 | Loudoun County Transportation Committee |
| December 5, 2000 | MWAA |
| December 15, 2000 | VDOT Capital Beltway Study Team |
| December 18, 2000 | VDOT Staff and Consultant |
| December 20, 2000 | Fairfax County, Loudoun County, and MWAA |
| January, February, March 2001 | Special series of meetings with VDOT on co-location in Tysons Corner |
| January 4, 2001 | MWAA |
| January 9, 2001 | MWAA |
| January 16, 2001 | Fairfax County Dulles Corridor Land Use Task Force |
| January 17, 2001 | All Operating Agencies |
| January 23, 2001 | Fairfax County and VDOT |
| January 25, 2001 | City of Falls Church |
| February 5, 2001 | Fairfax County and VDOT |
| February 8, 2001 | MWAA |
| February 14, 2001 | Fairfax County and VDOT |
| February 21, 2001 | Operating Agencies |
| February 27, 2001 | Fairfax County and VDOT |
| February 28, 2001 | Virginia State Historic Preservation Officer (SHPO) and MWAA |
| March 5, 2001 | Fairfax County and VDOT |
| March 7, 2001 | Loudoun County, TRIP II, and VDOT |
| March 8, 2001 | MWAA |
| March 21, 2001 | Operating Agencies |
| March 23, 2001 | Fairfax County and VDOT |
| April 3, 2001 | Fairfax County Park Authority |
| April 3, 2001 | Loudoun County Department of Parks, Recreation, and Community Services |
| April 10, 2001 | MWAA |
| April 18, 2001 | Operating Agencies |
| April 20, 2001 | Fairfax County and VDOT |
| April 23, 2001 | Chairman Katherine K. Hanley and Supervisor Gerald E. Connolly (Providence District), Fairfax County Board of Supervisors |
| April 23, 2001 | Supervisor Catherine M. Hudgins (Hunter Mill District), Fairfax County Board of Supervisors |
| April 24, 2001 | National Park Service and Wolf Trap Foundation |
| April 27, 2001 | Northern Virginia Regional Park Authority |
| May 2, 2001 | Fairfax County Planning Commission |
| May 4, 2001 | Supervisor Stuart Mendelsohn (Dranesville District), Fairfax County Board of Supervisors |
| May 7, 2001 | Loudoun County Board of Transportation |
| May 21, 2001 | Fairfax County Board of Supervisors |

| Date of Meetings | Agencies Attending |
|---|---|
| May 23, 2001 | Operating Agencies |
| June 5, 2001 | Town of Herndon Council |
| June 12, 2001 | Town of Herndon Council Public Hearing |
| June 19, 2001 | Supervisor Catherine M. Hudgins (Hunter Mill District), Fairfax County Board of Supervisors |
| July 11, 2001 | National Park Service and Wolf Trap Foundation |
| July 12, 2001 | Town of Herndon |
| July 20, 2001 | Fairfax County |
| July 24, 2001 | Loudoun County |
| July 26, 2001 | MWAA Fire and Police staff |
| August 2, 2001 | MWAA |
| August 8, 2001 | National Park Service |
| August 30, 2001 | MWAA |
| September 13, 2001 | Loudoun County Board of Supervisors Transportation Committee |
| September 17, 2001 | Fairfax County Economic Development Authority |
| September 26, 2001 | MWAA |
| October 1, 2001 | FAA |
| October 1, 2001 | Fairfax County |
| October 15, 2001 | Fairfax County |
| October 30, 2001 | Supervisor Catherine M. Hudgins (Hunter Mill District), Fairfax County Board of Supervisors |
| November 15, 2001 | Chairman Sean T. Connaughton, Prince William Board of County Supervisors |
| December 7, 2001 | Supplemental Rail Yard Study Kick-Off Meeting—Loudoun County and MWAA |
| December 10, 2001 | Loudoun County |
| December 17, 2001 | FAA and MWAA |
| February 11, 2002 | Fairfax County Board of Supervisors Transportation Committee |
| February 26, 2002 | Town of Herndon |
| March 14, 2002 | Loudoun County Transportation Committee |
| March 26, 2002 | Chairman Katherine K. Hanley, Fairfax County Board of Supervisors |
| March 28, 2002 | Chairman Chris Zimmerman, Arlington County Board |
| April 1, 2002 | Supervisor Dana Kauffman, Fairfax County Board of Supervisors |
| April 1, 2002 | Council Member William Euille, Alexandria City Council |
| April 22, 2002 | Fairfax County Board of Supervisors Transportation Committee |

# Appendices

# List of Preparers A

## APPENDIX A: LIST OF PREPARERS

| | |
|---|---|
| **FEDERAL TRANSIT ADMINISTRATION** | Matthew Welbes, *Acting Director, Washington D.C. Metropolitan Office*<br>Douglas A. Kerr, P.E., *Director, Washington D.C. Metropolitan Office (through 10/2001)*<br>Deborah R. Burns, *Senior Planner, Washington D.C. Metropolitan Office*<br>A. Joseph Ossi, *Environmental Planner, Office of the Human and Natural Environment*<br>Carol Braegelmann, *Environmental Protection Specialist*<br>Patricia Kampf, *Transportation Program Specialist*<br>Sharon Pugh, *Senior Transportation Planner* |
| **VIRGINIA DEPARTMENT OF RAIL AND PUBLIC TRANSPORTATION** | Corey Hill, *Project Manager, Northern Virginia Regional Manager*<br>Karl A. Rohrer, AICP, *Project Manager (through 2/2002)* |
| **WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY** | P. Takis Salpeas, *Assistant General Manager*<br>Ik Pyo Hong, AIA, *Director of Extensions*<br>John M. Dittmeier, P.E., *Acting Project Manager*<br>Leonard E. Alfredson, P.E., *Senior Project Manager (through 6/2001)*<br>James Ashe, P.E., CPG, *Acting Assistant Project Manager, Environmental*<br>Tom Crone, *Assistant Project Manager, Financial*<br>Neil Nott, R.A., *Assistant Project Manager, Facilities*<br>Dan Shiau, P.E., *Assistant Project Manager, Line and Systems* |
| **DMJM/DELEUW, a joint venture** | Herbert Spooner, P.E., *Project Manager*<br>Charles M. Hymes, Jr., P.E., *Project Manager (through 5/2002)*<br>Paul Elman, P.E., *Deputy Project Manager, Line and Systems Engineering*<br>James A. Gast, AIA, *Deputy Project Manager, Facilities*<br>Sina Raouf, AICP, *Deputy Project Manager, Environmental and Planning*<br>Joshua Sawislak, AICP, *Deputy Project Manager, Environmental and Planning (through 8/2001)*<br>Anne McNulty Darnall, *Environmental Manager*<br>Terri Morrell, AICP, *EIS Manager*<br>Sean Libberton, *Transportation Planning Manager*<br>Kenneth Mobley, AICP, *Land Use/Socioeconomic Planning Manager*<br>Diana Mendes, AICP, *Senior Technical Advisor*<br>Stephen C. Walter, *Senior Technical Advisor* |

| | |
|---|---|
| **DMJM/DELEUW, a joint venture (continued)** | Sam Zimmerman, *Senior Technical Advisor*<br>Jessica Shickman, *Alternatives Analysis*<br>Elizabeth Crowell, Ph.D., *Cultural Resources*<br>Elizabeth B. O'Brien, *Cultural Resources*<br>Laurie Paonessa, *Cultural Resources*<br>John S. Bender, *Environmental Planning*<br>Cyrena Eitler, AICP, *Environmental Planning*<br>Carmen Gilotte, *Environmental Planning*<br>Robert Hertz, AICP, *Environmental Planning*<br>Sarah Hillegass, *Environmental Planning*<br>Peter Magaro, *Environmental Planning*<br>Doy Miller, CSP, *Environmental Planning*<br>Suni Shrestha, *Environmental Planning*<br>Colleen Smith, *Environmental Planning*<br>Matthew Anderson, *Geographic Information Systems*<br>Robert Burns, *Geographic Information Systems*<br>Travis Forden, *Geographic Information Systems*<br>Paul Rostolsky, *Geographic Information Systems*<br>Doug Scrivener, *Geographic Information Systems*<br>Laura Frawley Musser, *Graphics Design Manager*<br>Jessica Jackson, *Graphics Design*<br>David Nelson, *Graphics Design*<br>Nolan Strals, *Graphics Design*<br>Narobi Thomas, *Graphics Design*<br>Jennifer Clinger, *Land Use/Socioeconomic Planning*<br>William Kerr, *Land Use/Socioeconomic Planning*<br>David Oremland, *Land Use/Socioeconomic Planning*<br>Daniel Prevost, *Land Use/Socioeconomic Planning*<br>Keith Hudson, AIA, *Renderings*<br>Lilly Hardin, P.E., *Traffic Analysis*<br>Siridol Siridhara, Ph.D., *Traffic Analyisis*<br>Chris Bell, AICP, *Transportation Planning*<br>Kristen Dirnberger, AICP, *Transportation Planning*<br>Douglas Lucuis, *Transportation Planning*<br>Maureen Paz de Araujo, AICP, *Transportation Planning*<br>Monica Toole, P.E., *Transportation Planning* |
| **PARSONS BRINCKERHOFF QUADE & DOUGLAS** | Edward W. Axt, Jr., P.E., *Deputy Project Manager, Financial*<br>Kenneth Knight, P.E., *Deputy Project Manager, Line and Systems Engineering (through 12/2001)* |

| | |
|---|---|
| **PARSONS BRINCKERHOFF QUADE & DOUGLAS (continued)** | Hanan A. Kivett, AIA, *Senior Technical Advisor*<br>Donna McCormick, AICP, *Environmental Planning*<br>Alice Lovegrove, *Environmental Planning*<br>Lisa A. Santiago, *Environmental Planning*<br>Melissa Zeppie, *Environmental Planning*<br>Sashi Amatya, *Traffic Analysis*<br>Mark C. Walker, AICP, *Visual and Aesthetic*<br>Jeff Parrish, *Design Coordinator* |
| **AECOM CONSULTING TRANSPORTATION GROUP** | Robert Peskin, Ph.D., *Financial Analysis*<br>Matthew Bieschke, *Financial Analysis*<br>Jeffrey Bruggeman, *Patronage* |
| **KM CHNG ENVIRONMENTAL, INC** | David Ernst, *Air Quality*<br>Thomas Herzog, *Noise & Vibration*<br>Richard Letty, *Noise & Vibration* |
| **COASTAL RESOURCES, INC.** | Bridgette Grillo, *Natural Resources*<br>David Smith, PWS, *Natural Resources*<br>Betsy Weinkam, *Natural Resources* |
| **DANIEL CONSULTANTS, INC.** | Tanya King, *Traffic*<br>S. Manzur Elahi, *Traffic* |
| **EEE CONSULTING** | Sharon Harless, *Hazardous Materials* |
| **FITZGERALD & HALLIDAY** | Pawan Mani, *Traffic*<br>Charles Smith, *Traffic*<br>Carla Tillery, *Traffic*<br>Silvie Zajac, *Traffic* |
| **GALLOP CORPORATION** | Eric Ho, Ph.D., *Traffic/Patronage* |
| **MANUEL PADRON & ASSOCIATES** | James Baker, *Operations Planning*<br>John Mason, *Operations Planning* |
| **TRAVESKY & ASSOCIATES, LTD.** | Marie B. Travesky, *Public Involvement Manager*<br>Jamie C. Croney, *Public Involvement*<br>Joan DuBois, *Public Involvement*<br>Denise H. Nugent, *Public Involvement*<br>F. Tracey Pilkerton, *Public Involvement*<br>Tara Wiedeman, *Public Involvement* |
| **WILSON, IHRIG & ASSOCIATES, INC** | Stephen C. Wolfe, *Noise & Vibration* |

References throughout this document to Capital Transit Consultants refer to a consortium of consulting firms under contract to the Washington Metropolitan Area Transit Authority (WMATA) to provide environmental,

planning, engineering, architectural, and management services in support of the preparation of this document. Capital Transit Consultants is a consortium of four firms under separate contract to WMATA. Member firms in the consortium who assisted in the preparation of this document are:

DMJM/DELEUW, a joint venture of DMJM+HARRIS, Inc. and Parsons Transportation Group and subconsultants to the joint venture.

Parsons Brinckerhoff Quade & Douglas and subconsultants.

The other two members of the Capital Transit Consultants consortium did not participate in the preparation of this document because of potential involvement in the implementation phase of the project.

# Draft EIS Recipients B

# Draft EIS Recipients

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| Hon. James | Moran | Congressman | U.S. House of Representatives | | 1 | | |
| Hon. Frank | Wolf | Congressman | U.S. House of Representatives | | 1 | 1 | 1 |
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| | | Chief of Staff, Governor's Office | Commonwealth of Virginia | | 1 | 1 | 1 |
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| Hon. Leslie | Byrne | State Senator | Commonwealth of Virginia | | 1 | | |
| Hon. Janet | Howell | State Senator | Commonwealth of Virginia | | 1 | | |
| Hon. Bill | Mims | State Senator | Commonwealth of Virginia | | 1 | | |
| Hon. Mary Margaret | Whipple | State Senator | Commonwealth of Virginia | | 1 | | |
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| Hon. Robert | Brink | State Delegate | Commonwealth of Virginia | | 1 | | |
| Hon. Vincent | Callahan | State Delegate | Commonwealth of Virginia | | 1 | | |
| Hon. Jeannemarie A. | Devolites | State Delegate | Commonwealth of Virginia | | 1 | | |
| Hon. Robert | Hull | State Delegate | Commonwealth of Virginia | 1 | | | |
| Hon. Joe | May | State Delegate | Commonwealth of Virginia | | 1 | | |
| Hon. Kenneth | Plum | State Delegate | Commonwealth of Virginia | | 1 | | |
| Hon. Gary A. | Reese | State Delegate | Commonwealth of Virginia | | 1 | | |
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| Hon. Penelope A. | Gross | Mason District Supervisor | Fairfax County Board of Supervisors | | 1 | | |
| Hon. Catherine M. | Hudgins | Hunter Mill District Supervisor | Fairfax County Board of Supervisors | | 1 | | |
| Hon. Gerald W. | Hyland | Mt. Vernon District Supervisor | Fairfax County Board of Supervisors | | 1 | | |
| Hon. Dana | Kauffman | Lee District Supervisor | Fairfax County Board of Supervisors | | 1 | | |
| Hon. Elaine | McConnell | Springfield District Supervisor | Fairfax County Board of Supervisors | | 1 | | |
| Hon. Stuart | Mendelsohn | Dranesville District Supervisor | Fairfax County Board of Supervisors | | 1 | | |
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| Hon. William | Bogard | Sugarland District Supervisor | Loudoun County Board of Supervisors | | 1 | | |
| Hon. Jim | Burton | Mercer District Supervisor | Loudoun County Board of Supervisors | | 1 | | |
| Hon. Eugene | Delgaudio | Sterling District Supervisor | Loudoun County Board of Supervisors | | 1 | | |
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| Hon. Mark R. | Herring | Leesburg District Supervisor | Loudoun County Board of Supervisors | | 1 | | |

| First Name | Last Name | Title | Organization/Company | ES | VOL1 | VOL2 | VOL 3,4 |
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| Hon. Richard C. | Thoesen | Mayor | Town of Herndon | | 1 | | |
| Hon. B.J. | Webb | Mayor | Town of Leesburg | | 1 | | |
| Hon. M. Jane | Seeman | Mayor | Town of Vienna | | 1 | | |
| | | | Alexandria City Council | | 1 | | |
| | | | Fairfax City Council | | 1 | | |
| | | | Falls Church City Council | | 1 | | |
| Hon. Anthony | Williams | Mayor | District of Columbia | | 1 | | |
| | | | D.C. City Council | | 1 | | |
| Mr. Parris N. | Glendening | Governor | State of Maryland | | 1 | | |
| Hon. Douglas | Duncan | County Executive | Montgomery County | | 1 | | |
| Hon. Wayne | Curry | County Executive | Prince George's County | | 1 | | |
| | | | Montgomery County Council | | 1 | | |
| | | | Prince George's County Council | | 1 | | |
| Mr. Don L. | Klima | Director, Planning and Review | Advisory Council on Historic Preservation | | 1 | | |
| Ms. Catherine | Lang | Director, Office of Airports Planning & Prog | Federal Aviation Administration | | 1 | 1 | 1 |
| Mr. Roberto | Fonseca-Martinez | Division Administrator | Federal Highway Administration | | 1 | 1 | 1 |
| Mr. Ed | Sunda | Capital Beltway Manager | Federal Highway Administration | | 1 | 1 | 1 |
| Ms. Patricia E. | Gallagher | Executive Director | National Capital Planning Commission | | 1 | 1 | 1 |
| Mr. Bill | Crockett | Director, Wolf Trap Farm Park | National Park Service | | 1 | 1 | 1 |
| Mr. Patrick | Gregerson | | National Park Service | | 1 | 1 | 1 |
| Mr. Tony | Canuso | Project Manager | Transportation Construction Services, Inc. | | 1 | 1 | 1 |
| Mr. Bruce F. | Williams | Chief, Northern Virginia Regulatory Section | U.S. Army Corps of Engineers | | 1 | | |
| Ms. Cynthia | Wood | Northern Virginia Field Office | U.S. Army Corps of Engineers | | 1 | 1 | 1 |
| Ms. Mary Ann | Wilson | Virginia State Office Coordinator | U.S. Department of Housing and Urban Develop | | 1 | | |
| Mr. Willie | Taylor | Director, Environmental Compliance | U.S. Department of Interior | | 12 | 12 | |
| Mr. Bob | Brown | | U.S. Department of Transportation | | 1 | | |
| Mr. Peter | Stokely | Environmental Scientist | U.S. Environmental Protection Agency | | 1 | 1 | 1 |
| Mr. William | Hester | Virginia Field Office | U.S. Fish & Wildlife Service | | 1 | 1 | |
| Ms. Denise | Doetzer | Virginia State Conservationist | U.S.D.A. Natural Resources Conservation Servic | | 1 | | |
| Dr. Charles | Baummer | | Metropolitan Washington Airports Authority | | 1 | 1 | 1 |
| Mr. Jonathan | Gaffney | Vice President for Communications | Metropolitan Washington Airports Authority | 1 | | | |
| Mr. Mike | Hackett | Airport Planning Engineer | Metropolitan Washington Airports Authority | | 2 | 2 | 2 |
| Mr. William | Lebegern | Planning Director | Metropolitan Washington Airports Authority | | 1 | 1 | 1 |
| Mr. Henry | Ward | Archaeology & Historic Sites Coordinator | Metropolitan Washington Airports Authority | | 1 | 1 | 1 |
| Mr. James | Wilding | President & CEO | Metropolitan Washington Airports Authority | 1 | | | |
| Mr. Ronald | Kirby | Transportation Planning Director | Metropolitan Washington Council of Government | | 1 | 1 | 1 |
| Mr. Michael | Rogers | Executive Director | Metropolitan Washington Council of Government | | 1 | | |

| First Name | | Last Name | Title | Organization/Company | ES | VOL1 | VOL2 | VOL 3,4 |
|---|---|---|---|---|---|---|---|---|
| Mr. | Mark | Gibb | Executive Director | Northern Virginia Regional Commission | | 1 | | |
| Ms. | Katherine | Rudacille | Manager Land Administration & Planning | Northern Virginia Regional Park Authority | | 1 | 1 | 1 |
| Ms. | Diane | Hoffman | District Administrator | Northern Virginia Soil and Water Conservation Di | | 1 | | |
| Mr. | Richard | Taube | Executive Director | Northern Virginia Transportation Commission | | 2 | | |
| Ms. | Trudye | Johnson | Executive Director | The Maryland-National Capital Park and Plannin | | 1 | | |
| | | | | Washington Metropolitan Area Transit Commissi | | 1 | | |
| | | | | Washington Suburban Transit Commission | | 1 | | |
| Mr. | W. Douglas | Beisch | Senior Environmental Engineer | Chesapeake Bay Local Assistance Department | | 1 | | |
| Hon. | Whittington W. | Clement | Secretary of Transportation | Commonwealth of Virginia | | 1 | | |
| Mr. | Ambrose W. | Bailey | Fredericksburg District | Commonwealth Transportation Board | 1 | | | |
| Mr. | Roy Parrish | Byrd | Lynchburg District | Commonwealth Transportation Board | 1 | | | |
| Mr. | John J. | Davies III | Culpeper District | Commonwealth Transportation Board | 1 | | | |
| Mr. | S. Grey | Folkes, Jr. | At-Large Urban | Commonwealth Transportation Board | 1 | | | |
| Mr. | Edward S. | Garcia | Hampton Roads District | Commonwealth Transportation Board | 1 | | | |
| Mr. | John H. | Grubb, Jr. | At-Large Rural | Commonwealth Transportation Board | 1 | | | |
| Mr. | J. Kenneth | Klinge | NoVa District | Commonwealth Transportation Board | | 1 | 1 | 1 |
| Mr. | Bryan E. | Kornblau | Richmond District | Commonwealth Transportation Board | 1 | | | |
| Ms. | Lorinda G. | Lionberger | Salem District | Commonwealth Transportation Board | 1 | | | |
| Mr. | L.C. 'Sonny' | Martin | Bristol District | Commonwealth Transportation Board | 1 | | | |
| Mr. | Leonard S. "Hobi | Mitchell | At-Large Urban | Commonwealth Transportation Board | | 1 | | |
| Mr. | Gary D. | Walker | At-Large Rural | Commonwealth Transportation Board | 1 | | | |
| Ms. | Olivia A. 'Libby' | Welsh | Staunton District | Commonwealth Transportation Board | 1 | | | |
| Mr. | Ulysses X. | White | At-Large Urban | Commonwealth Transportation Board | | 1 | | |
| Mr. | Frank | Fulgham | Office of Plant & Pest Services | Virginia Department of Agriculture and Consume | | 1 | | |
| Mr. | Kenneth F. | Wiegand | Director | Virginia Department of Aviation | 1 | | | |
| Mr. | Derral | Jones | | Virginia Department of Conservation and Recrea | | 4 | | |
| Ms. | Joan C. | Crowther | Resources Development Supervisor | Virginia Department of Environmental Quality | | 1 | | |
| Mr. | Martin | Ferguson | Division of Water Program Coordination | Virginia Department of Environmental Quality | | 1 | | |
| Ms. | Ellie L. | Irons | EIR Program Manager | Virginia Department of Environmental Quality | | 1 | | |
| Mr. | James | Ponticello | Division of Air Program Coordination | Virginia Department of Environmental Quality | | 1 | | |
| Mr. | Tom | Modena | Division of Waste Inspections Coordination | Virginia Department of Environmental Quality, Di | | 1 | | |
| Mr. | Charles D. | Forbes | Regional Permit Manager | Virginia Department of Environmental Quality, N | | 1 | | |
| Mr. | J. Michael | Foreman | Forest Legacy Management | Virginia Department of Forestry | | 1 | | |
| Mr. | Raymond | Fernald | | Virginia Department of Game and Inland Fisheri | | 1 | | |
| Ms. | Susan | Douglas | Division of Water Supply Engineering | Virginia Department of Health | | 1 | | |
| Ms. | Ethel | Eaton | | Virginia Department of Historic Resources | | 1 | | |
| Ms. | Kathleen S. | Kilpatrick | Director | Virginia Department of Historic Resources, State | | 1 | 1 | 1 |
| Mr. | Eugene | Rader | Division of Mineral Resources | Virginia Department of Mines, Minerals & Energy | | 1 | | |
| Ms. | Angel | Deen | Environmental Division | Virginia Department of Transportation | | 2 | | |
| Mr. | Chris | Detmer | Transportation Planning | Virginia Department of Transportation | | 1 | 1 | 1 |
| Mr. | Philip | Shucet | Commissioner | Virginia Department of Transportation | 1 | | | |
| Ms. | Katherine | Tracy | Assistant Secretary to the CTB | Virginia Department of Transportation | 1 | | | |

| First Name | | Last Name | Title | Organization/Company | ES | VOL1 | VOL2 | VOL 3,4 |
|---|---|---|---|---|---|---|---|---|
| Mr. | Ken | Wilkinson | Environmental Quality | Virginia Department of Transportation | | 1 | 1 | 1 |
| Ms. | Fatemeh | Allahdoust | Senior Transportation Engineer | Virginia Department of Transportation- NOVA | | 2 | 2 | 2 |
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| Ms. | JoAnne | Sorenson | Asst Dist Admin for Planning & Developme | Virginia Department of Transportation- NOVA | | 1 | | |
| Ms. | Crystal | Vincent | | Virginia Economic Development Partnership | | 1 | | |
| Mr. | Robert | Grabb | Assistant Commissioner | Virginia Marine Resources Commission | | 1 | | |
| Mr. | Peter | Sklannik, Jr. | Director | Virginia Railway Express | 1 | | | |
| Mr. | John | Porcari | Secretary | Maryland Department of Transportation | | 1 | | |
| | | | | Maryland State Planning Department | | 1 | | |
| Mr. | Henry | Kay | Director of Planning | Maryland Transit Administration | | 1 | | |
| Mr. | Ron | Carlee | County Manager | Arlington County | 1 | | | |
| Mr. | James | Hamre | Transit Coordinator, Planning Division | Arlington County Department of Public Works | | 1 | | |
| Mr. | Anthony H. | Griffin | County Executive | Fairfax County | 1 | | | |
| Dr. | Carol S. | Sharrett | Director | Fairfax County Department of Health | | 1 | | |
| Ms. | Paula C. | Sampson | Director | Fairfax County Department of Housing and Com | | 1 | | |
| Ms. | Heidi | Merkel | | Fairfax County Department of Planning and Zoni | | 1 | 1 | 1 |
| Mr. | Fred | Selden | Planning Division Director | Fairfax County Department of Planning and Zoni | | 1 | 1 | 1 |
| Mr. | Sterling | Wheeler | Branch Chief, Policy Planning & Developm | Fairfax County Department of Planning and Zoni | | 1 | 1 | 1 |
| Mr. | James | Zook | Director | Fairfax County Department of Planning and Zoni | | 1 | 1 | 1 |
| Mr. | John | Wesley White | Director | Fairfax County Department of Public Works and | | 1 | 1 | 1 |
| Mr. | Tom | Black | Transportation Planner | Fairfax County Department of Transportation | | 1 | 1 | 1 |
| Mr. | Jim | Carrell | Transportation Planner | Fairfax County Department of Transportation | | 1 | 1 | 1 |
| Mr. | Young Ho | Chang | Director | Fairfax County Department of Transportation | | 1 | 1 | 1 |
| Ms. | Katharine | Ichter | Chief, Highway Operations Division | Fairfax County Department of Transportation | | 1 | | 1 |
| Dr. | Gerald | Gordon | President | Fairfax County Economic Development Authority | | 1 | | |
| Mr. | Edward | Stinnette | Fire Chief | Fairfax County Fire and Rescue Department | | 1 | | |
| Mr. | Patricia | Franckewitz | Director | Fairfax County Office of Community and Recreat | 1 | | | |
| Ms. | Merni | Fitzgerald | Director | Fairfax County Office of Public Affairs | 1 | | | |
| Mr. | Stan | Barry | Sheriff | Fairfax County Office of the Sheriff | | 1 | | |
| Ms. | Karen | Lanham | Planning Section Supervisor | Fairfax County Park Authority | | 1 | | |
| Mr. | J. Thomas | Manger | Chief of Police | Fairfax County Police Department | | 1 | | |
| Dr. | Daniel | Domenech | Superintendent of Schools | Fairfax County Public Schools | | 1 | | |
| Mr. | Steven | Weisberger | Manager, Planning Branch | Fairfax County Water Authority | | 1 | | |
| Mr. | Kirby | Bowers | County Administrator | Loudoun County | 1 | | | |
| Ms. | Terrie L. | Laycock | Assistant to County Administrator | Loudoun County | | 1 | 1 | 1 |
| Ms. | Julie | Pastor | Director of Planning | Loudoun County | | 1 | 1 | 1 |
| Mr. | Lawrence | Rosenstrauch | Director, Economic Development | Loudoun County | | 1 | | |
| Ms. | Cindy | Welsh | Director of Parks, Recreation & Communit | Loudoun County | | 1 | | |
| Mr. | Terrance | Wharton | Director, Building and Development | Loudoun County | | 1 | 1 | 1 |
| Ms. | Jana | Lynott | Senior Planner | Loudoun County Department of Planning | 1 | | | |
| Mr. | John J. | Clark | Director | Loudoun County Office of Transportation Service | | 1 | 1 | 1 |

| First Name | | Last Name | Title | Organization/Company | ES | VOL1 | VOL2 | VOL 3,4 |
|---|---|---|---|---|---|---|---|---|
| Mr. | Chip | Taylor | Senior Transportation Planner | Loudoun County Office of Transportation Service | | 1 | 1 | 1 |
| Mr. | Alex | Verzosa | Transportation Director | City of Fairfax | | 1 | | |
| Mr. | Willie | Best | Assistant City Manager | City of Falls Church | | 1 | 1 | 1 |
| Mr. | Gary | Fuller | Senior Planner | City of Falls Church | | | | 1 |
| Ms. | Vannesa Dale | Burns | Director | District of Columbia Department of Public Works | | 1 | | |
| Mr. | Mark | Duceman | Transportation Planner, Department of Co | Town of Herndon | | | | 1 |
| Mr. | John E. | Moore | Town Manager | Town of Herndon | | 1 | 1 | 1 |
| Mr. | Brent | Wilkinson | Senior Planner | Town of Vienna | | 1 | | |
| | | | | Amalgamated Transit Union | | 1 | | |
| | | | | International Brotherhood of Teamsters, Local 2 | | 1 | | |
| | | | | International Brotherhood of Teamsters, Local 9 | | 1 | | |
| | | | | United Motor Coach Association | | 1 | | |
| | | | | Arlington Central Library | | 1 | 1 | 1 |
| | | | | Ashburn Farm Association | | 1 | 1 | 1 |
| | | | | Broadlands Visitors Center | | 1 | 1 | 1 |
| | | | | Dolley Madison Community Library | | 1 | 1 | 1 |
| | | | | Eastern Loudoun Regional Library | | 1 | 1 | 1 |
| | | | | Fairfax City Regional Library | | 1 | 1 | 1 |
| | | | | Falls Church Community Center | | 1 | 1 | 1 |
| | | | | Falls Church Library | | 1 | 1 | 1 |
| | | | | Great Falls Community Library | | 1 | 1 | 1 |
| | | | | Greater Reston Chamber of Commerce | | 1 | 1 | 1 |
| | | | | Herndon Community Center | | 1 | 1 | 1 |
| | | | | Herndon Fortnightly Library | | 1 | 1 | 1 |
| | | | | Lovettsville Library | | 1 | 1 | 1 |
| | | | | McLean Community Center | | 1 | 1 | 1 |
| | | | | Middleburg Library | | 1 | 1 | 1 |
| | | | | Patrick Henry Community Library | | 1 | 1 | 1 |
| | | | | Purcellville Library | | 1 | 1 | 1 |
| | | | | Reston Community Center | | 1 | 1 | 1 |
| | | | | Reston Regional Library | | 1 | 1 | 1 |
| | | | | Rust Library | | 1 | 1 | 1 |
| | | | | Sterling Library | | 1 | 1 | 1 |
| | | | | Thomas Balch Library for Local History | | 1 | 1 | 1 |
| | | | | Tysons-Pimmit Regional Library | | 1 | 1 | 1 |
| | | | | Vienna Community Center | | 1 | 1 | 1 |
| Mr. | Michael | Bartscherer | | America Online, Inc. | | 1 | | |
| Mr. | Chris | Antigone | | Antigone Realty, Inc. | | 1 | 1 | 1 |
| Mr. | David | Ross | | Atlantic Realty Companies | | 1 | | |

| First Name | | Last Name | Title | Organization/Company | ES | VOL1 | VOL2 | VOL 3,4 |
|---|---|---|---|---|---|---|---|---|
| Mr. | Bryon | Barlow | Vice President | B.F. Saul Company | | 1 | | |
| Mr. | Ralph | Shrader | Chairman & CEO | Booz-Allen & Hamilton, Inc. | | 1 | | |
| Mr. | Peter D. | Johnston | Senior Vice President | Boston Properties, Inc. | | 1 | | |
| | | | Chain Bridge Hospitality Corporation | c/o BF Saul Company | | 1 | | |
| Ms. | Lisa | Lapane | c/o Linpro | Cambridge Management | | 1 | | |
| Mr. | Barry | Mark | Regional Manager, Corporate Real Estate | Capital One Financial Services Corporation | | 1 | | |
| Mr. | John | Schlichting | Vice President/Director of Development | Carr America Development, Inc. | | 1 | | |
| | | | | Carrington Community Association, Inc. | | 1 | | |
| Ms. | Anne | Armstrong | Director | Center for Innovative Technology | | 1 | | |
| Mr. | Scott | Sterling | | Charles E. Smith Commercial Realty L.P. | | 1 | | |
| Mr. | Andy | Cherner | | Cherner Lincoln Mercury | | 1 | | |
| Mr. | Tom | Ulrich | President | Cinnamon Creek Homes Association | | 1 | | |
| Ms. | Georgia | Graves | c/o Bridgman Communications,□Inc. | Committee for Dulles | | 1 | | |
| Mr. | Gregg | Hamm | | Crimson Partners | | 1 | | |
| Mr. | Brian T. | McVay | | Cushman & Wakefield | | 1 | | |
| Mr. | Jim | Larsen | | DATA | | 1 | | |
| Mr. | R. Kevin | Dougherty | | DSV Dulles Fox Mill LP | | 1 | | |
| Ms. | Patricia | Nicoson | President | Dulles Corridor Rail Association | | 1 | 1 | 1 |
| Mr. | Tom | Sines | Director of Operations | Dulles Greenway/Toll Road Investors Partnershi | | 1 | 1 | 1 |
| Mr. | Paul | Lombardi | President & CEO | DynCorp | | 1 | | |
| Ms. | Yvonne | Jeziorski | General Manager | Embassy Suites Hotel | | 1 | | |
| | | | President & CEO | Fairfax County Chamber of Commerce | | 1 | | |
| Mr. | Verlin | Smith | | Farms & Acreage | | 1 | | |
| Ms. | Mary | Kenny | c/o Federal Realty Investment Trust | FR PIKE 7 LP | | 1 | | |
| Mr. | William | Menda | Vice President, Administration & Corporate | Freddie Mac | | 1 | | |
| Ms. | Patricia | Blackburn | Executive Vice President | Gates Hudson & Associates, Inc. | | 1 | | |
| | | | Executive Director | Greater Falls Church Chamber of Commerce | | 1 | | |
| Mr. | Steve | Braesch | | Greenebaum & Rose Associates | | 1 | | |
| Mr. | Clark | Tyler | President | Hallcrest Heights Associates, Inc. | | 1 | | |
| Ms. | Eileen | Curtis | Executive Director | Herndon Dulles Chamber of Commerce | | 1 | | |
| Mr. | James | Deuel | General Manager | Hyatt Dulles | | 1 | | |
| Mr. | Ilan | Scharfstein | | JBG Companies | | 1 | | |
| Mr. | Ben | Comm | | Jones, Lang & LaSalle | | 1 | | |
| Mr. | Brian J. | Cullen | Chairman of the Economic Development C | Keane Enterprises | | 1 | | |
| Mr. | Bob | Farlow | | Koons Tysons Toyota | | 1 | | |
| Ms. | Katherine | Clark | CEO | Landmark Systems | | 1 | | |
| Mr. | Eric C. | Peterson | Executive Director | LEADER | | 1 | 1 | 1 |
| Mr. | Peter | Rosen | Senior Development Director | Lerner Enterprises | | 1 | | |
| Ms. | Gail | Hunt | | Lillian Court Condominium Association | | 1 | | |
| Mr. | John | Lebeau | | Lincoln Property Company | | 1 | | |
| Mr. | Randy | Collins | President | Loudoun County Chamber of Commerce | | 1 | | |
| Mr. | James | Luehrs | | Luehrs Corporation | | 1 | | |

| First Name | Last Name | Title | Organization/Company | ES | VOL1 | VOL2 | VOL 3,4 |
|---|---|---|---|---|---|---|---|
| Mr. William | Nussbaum | | Mark Winkler Company | | 1 | | |
| Ms. Elise Neil | Bengtson | Executive Director | McLean Chamber of Commerce | | 1 | | |
| Ms. Olivia | Jenney | Chair, Transportation Committee | McLean Citizens Association | | 1 | | |
| Mr. Cary M. | Euwer, Jr. | President & CEO | Metropolitan Partnership, Ltd. | | 1 | | |
| Mr. Randolph A. | Sutliff | | Miles & Stockbridge | | 1 | | |
| Mr. John T. | Conrad | | Miller & Smith, Inc. | | 1 | | |
| Mr. Bob | Hughes | General Manager | Moore Cadillac Company | | 1 | | |
| Mr. Phillip | Brady | | National Automobile Dealers Association | | 1 | | |
| Mr. Joseph F. | Siekierski | | National Rural Utilities Cooperative Finance Cor | | 1 | | |
| Mr. Tim | Donahue | President | Nextel Communications | | 1 | | |
| Ms. Erin | McComas | | Northwestern Investment Management Compan | | 1 | | |
| Mr. Samuel A. | Rocks | | Nugget Joint Venture LC | | 1 | | |
| Mr. Jack | Suchland | Facility Manager | Oracle Corporation | | 1 | | |
| Mr. George | Steiner | General Manager | Peacock Buick and Suzuki | | 1 | | |
| Mr. Jeff | Wiese | President | Polo Fields Association | | 1 | | |
| Mr. Mark | Brungart | | Quadrangle Development Corporation | | 1 | | |
| Hon. Robert L. | Calhoun | | Redmon, Boykin & Braswell | | 1 | | |
| Mr. Don | Bachenberg | | Regency at McLean | | 1 | | |
| Mr. Michael | McGuire | Vice President | Reliance Development Group | | 1 | | |
| Mr. Gerald | Volloy | Executive Director | Reston Association | | 1 | 1 | 1 |
| Mr. Jorge | Kfoury | | Reston Investments LLC | | 1 | | |
| Mr. Robert | Hisoka | General Manager | Rosenthal Honda | | 1 | | |
| Mr. Jeff | Mariani | General Manager | Rosenthal Nissan | | 1 | | |
| Mr. Steve | Wright | | Rotonda Condominium Unit Owner Association | | 1 | 1 | 1 |
| Mr. Robert | Bishop | Director, Regional Facilities | SAIC | | 1 | | |
| Mr. Albert | Lord | CEO | Sallie Mae | | 1 | | |
| Mr. Dennis | Greene | | Security Storage Company of Washington | | 1 | | |
| Mr. Randy | Atkins | | Studley | | 1 | | |
| Mr. Thomas J. | D'Alesandro | | Terrabrook | | 1 | | |
| Mr. Charles | Veatch | | The Charles A. Veatch Company | | 1 | | |
| Ms. Colleen | Moorehead | | The Lincoln at Tysons | | 1 | | |
| Mr. Martin C. | Fage | Executive Vice President | The Mitre Corporation | | 1 | | |
| Mr. Kristopher | Hoover | Vice President | The Peter Lawrence Company | | 1 | | |
| Mr. James | Evans | Senior Director | Tishman Speyer Properties | | 1 | | |
| Mr. G. Cory | DeSpain | | Toll Brothers | | 1 | | |
| Mr. Scott | Boroczi | Trustee | Tosco Marketing Co. - DC 17, BNY Western Tru | | 1 | | |
| Mr. Brian | Coulter | | TrizecHahn Reston | | 1 | | |
| Mr. W. James | Green | Director, Facilities and Administrative Servi | TRW Systems Information & Technology Group | | 1 | | |
| Mr. Philip A. | Odeen | President | TRW, Inc. | | 1 | | |
| Mr. John | Motz | c/o Commercial Condominium Manageme | Tyco Park Condominium Association | | 1 | | |
| Ms. Kathy | Hannon | General Manager | Tysons Corner Center | | 1 | | |
| Mr. Ken | Peduzzi | General Manager, Sheraton Premier at Ty | Tysons Corner Hotel Co., Inc. | | 1 | | |

| First Name | Last Name | Title | Organization/Company | ES | VOL1 | VOL2 | VOL 3,4 |
|---|---|---|---|---|---|---|---|
| Mr. Rod | Renner | | Tysons Galleria | | 1 | | |
| Mr. Tom | Sims | General Manager | Tysons WestPark Hotel | | 1 | | |
| Ms. Lisa | Tuchtan | | U.S. Sprint | | 1 | | |
| Ms. Robin | Burke | Leasing Director | USAA Realty Co. LP | | 1 | | |
| Mr. Francis Gary | Powers, Jr. | President | Vienna-Tysons Regional Chamber of Commerce | | 1 | | |
| Mr. Mark | McGregor | CEO | Virginia Regional Transportation Association | | 1 | | |
| Mr. Leo | Schefer | President | Washington Airports Task Force | | 1 | | |
| Mr. Brian | Moran | | Washington Real Estate Investment Trust | | 1 | | |
| Mr. Tom | Fleury | | West*Group Properties LLC | | 1 | 1 | 1 |
| Mr. Charles | Walters, Jr. | Executive Vice President & CFO | Wolf Trap Foundation | | 1 | | |